

IDAHO DEPARTMENT OF FISH AND GAME

Rod Sando, Director

FEDERAL AID IN FISH RESTORATION
1991 Job Performance Report
Project F-71-R-16



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 2-a. Region 2 Mountain Lakes Investigations
Job No. 2-b. Region 2 Lowland Lake Investigations
Job No. 2-c. Region 2 Rivers and Streams Investigations
Job No. 2-d. Region 2 Technical Guidance

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JOB PERFORMANCE REPORT

State of: Idaho Name: Regional Fisheries Management
Investigations

Project: F-71-R-16 Title: Region 2 Mountain Lakes
Investigations

Job No.: 2-a

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

We performed a comprehensive survey of 55 mountain lakes in Region 2 in 1991.

Survey results showed 27 lakes were fishless. Of the remaining 28 lakes, 15 had self-supporting populations. Ten of these self-supporting populations probably originated from stocking. The other five lakes appeared to have native populations of fish. Nine lakes have fish populations that are the result of recent stocking and would probably only be maintained through further stocking. An additional four lakes were being stocked but may have a level of natural recruitment that is sufficient to maintain the population. We will postpone stocking for one 3-year rotation and resurvey those four lakes to determine if further stocking is necessary.

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METHODS

Comprehensive survey techniques described in Bahls (1989) were used by a backpack crew of two to survey mountain lakes in Region 2 in 1991.

Survey data collected included; physical, limnological, geographical, recreational, and biological.

RESULTS

Fifty-five lakes located in the northern section of the Selway Bitterroot Wilderness Area within the Clearwater National Forest were surveyed in 1991 (Table 1).

Of the 55 lakes surveyed, 27 (49%) were fishless. Of the 28 lakes containing fish, 15 (54%) contain native or natural populations, and 13 (46%) are being stocked to maintain the population.

The most unusual discoveries were found in several large, glacial valley lakes. One of these, Fish Lake, contains indigenous bull trout *Salvelinus confluentus* and westslope cutthroat trout *Oncorhynchus clarki lewisi*, representing the only lake of 250 lakes surveyed in the region known to contain bull trout (Bahls 1992).

Seventeen lakes surveyed were less than 3 m deep, 16 (94%) of these lakes were fishless. Thirty-eight lakes surveyed were 3 m deep or deeper, 27 of these lakes (71%) contained populations of fish, 11 were fishless (Table 2).

Table 1. Size and depth of mountain lakes surveyed in Region 2, 1991.

Lake name	Location			Size (ha)	Depth (m)
	Township	Range	Section		
Big Sand	34N	16E	6	30.2	14.2
California	35N	12E	30	3.6	4.1
Corky, Little	35N	16E	31	<1.0	0.4
Corky, Main	35N	16E	31	7.2	13.5
Dan Creek	36N	16E	16	0.6	0.4
Dan	36N	16E	9	1.9	3.9
Dodge	36N	16E	15	4.2	7.0
Duck, Lower	34N	15E	8	5.9	7.5
Duck, Upper	34N	15E	9	1.3	2.0
Eagle Point	35N	11E	29	2.3	4.3
Fish	35N	11E	35	22.3	11.8
Florence	33N	10E	28	12.4	7.5
Frog	35N	16E	33	0.7	2.7
Garnet, Upper	36N	16E	36	3.0	12.8
Garnet, Lower	36N	16E	31	0.7	5.5
Heather Creek	36N	16E	14	1.6	6.3
Hidden #1	35N	15E	24	2.5	3.0
Hidden #2	35N	16E	30	43.1	30.0
Hidden #3	35N	15E	36	3.1	4.4
Hungry	35N	14E	31	9.8	12.2
Jeanette, Main	34N	15E	10	0.6	6.4
Jeanette, North	34N	15E	9	0.6	1.3
Jeanette, Middle	34N	15E	9	0.7	1.5
Jeanette, South	34N	15E	9	0.4	0.5
Kettle	33N	10E	20	5.3	14.9
Kidney, Main	35N	14E	28	4.4	6.5
Kidney, Little	35N	14E	21	0.5	0.5
Long	35N	10E	25	11.4	18.7
Lottie, Upper	34N	10E	29	2.4	6.1
Maple Ridge, South	34N	14E	17	<1.0	2.9
Maple Ridge, North	34N	14E	18	1.0	2.7
Maud	36N	16E	12	9.4	6.0
Maude, West	34N	10E	30	2.2	9.8
Maude, North	34N	10E	30	0.6	2.5
Maude, East	34N	10E	29	1.9	6.2
Mud	34N	10E	29	1.7	3.3
Packbox, Lower	36N	16E	22	0.8	2.3
Packbox, Little	36N	16E	27	<1.0	1.3
Packbox, Upper	36N	16E	22	1.5	2.4
Parachute	36N	16E	35	12.4	22.9
Pollywog	35N	11E	29	0.5	4.3
Porphyry, South	34N	14E	7	4.5	9.3
Porphyry, North	34N	14E	6	2.2	13.3
Round	35N	11E	31	2.5	4.4
Sponge	35N	11E	21	4.4	3.5
Surprise Creek #4	34N	10E	28	1.5	3.8
Surprise Creek #3	34N	10E	28	0.8	6.4
Surprise Creek #2	34N	10E	28	0.5	3.2
Surprise Creek #1	34N	10E	28	0.9	2.0
Surprise Pond	34N	10E	29	<1.0	0.5
Tadpole	35N	16E	28	4.9	6.9
Two-Mile, South	34N	14E	5	2.5	6.0
Two-Mile, North	35N	14E	32	0.7	3.3
White Sand	36N	16E	23	13.0	30.0
Wood	33N	10E	18	0.7	2.4

Table 2. Summary of lake size and depth related to fish populations in Region 2 mountain lakes surveyed in 1991.

Size (ha)	Fishless Lakes		Fish Lakes	
	Depth		Depth	
	<3 m	≥3 m	<3 m	≥3 m
≤.4	12	2	1	4
>.4	4	5	0	9
>4.0	0	3	0	6
>8.0	0	1	0	8

LITERATURE CITED

- Bahls, P. 1989. A survey methodology for high mountain lakes. Nez Perce National Forest and Idaho Department of Fish and Game, Boise.
- Bahls, P. 1992. Report of the high lake fisheries project, Clearwater National Forest, 1991. Idaho Department of Fish and Game, Region 2, and U.S. Forest Service, Clearwater National Forest.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries
Management Investigations

Project: F-71-R-16

Title: Region 2 Lowland Lake
Investigations

Job No.: 2-b

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

We implemented a fingerling rainbow trout *Oncorhynchus mykiss* program in some of our lowland lakes to augment the catchable rainbow trout program.

Winchester Lake represented the most successful fingerling rainbow trout program. Fingerlings stocked in May at 190 mm average 237 mm by mid-October. These fish began contributing to the creel in mid-July.

From April through October 1991, we estimated 12,560 rainbow trout were harvested from the 1990 and 1991 fingerling plants in Winchester Lake. This represents a return rate of approximately 30% during this seven-month period. This harvest has an estimated biomass of 2,302 kg from a stocking of 381 kg of fingerling rainbow trout, a 603% return by weight.

Rainbow trout resulting from fingerling plants comprised 46% of the total trout creel in Winchester Lake, 24% in Spring Valley Reservoir, and 57% in Soldiers Meadow Reservoir in 1991.

Resurvey of the largemouth bass *Micropterus salmoides* population in Winchester Lake confirmed suspicions of year class failures presented in the 1990 findings. Proportional stock density (PSD) estimate was 29. We tagged 54 legal size bass (>305 mm) with five-dollar reward tags. Six tags returned provided an estimate of angler exploitation at 11%.

We sampled largemouth bass and smallmouth bass *M. dolomieu* population in Elk Creek Reservoir and found a PSD of 42 and 54, respectively.

We checked 1,478 anglers that fished 3,359 hours on Region 2 lowland lakes and reservoirs to catch 2,735 fish (0.81 fish/h).

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OBJECTIVES

1. Evaluate growth, relative abundance, composition in the creel, and catch rates of fingerling rainbow trout stocked in lowland lakes.
2. Re-assess angler exploitation rates and year class failures of largemouth bass in Winchester Lake.
3. Survey Elk Creek Reservoir to determine level of success of Lahontan cutthroat trout *O. clarki henshawi* introductions.

METHODS

We sampled fish in lowland lakes using pulsed D.C. current from a portable generator and a Coffelt VVP-2E pulsator. Booms and electrodes were mounted on a 16-foot john boat. All electrofishing took place between 2000 hours and 0200 hours.

To determine angler exploitation of largemouth bass in Winchester Lake, we tagged fish with numbered five-dollar reward Floy tags.

Age and growth estimates were made from scale analysis. Scales were dried and cleaned. Impressions were made in acetate slides using a heated press. Impressions were read on a microfiche reader. Where possible, at least 25 scales selected throughout the length distribution of each age class were read. This age distribution was applied to the total length distribution sample to produce a population age frequency.

We sampled rainbow trout and kokanee *O. nerka kennerlyi* in lowland lakes with gill nets. We used standard floating experimental gill nets 150 ft long by 6 ft deep with six panels of different size mesh. Mesh sizes were 3/4-in, 1-in, 1-1/4-in, 1.5-in, 2-in, and 2-1/2-in. Two nets were set and fished from late afternoon until early morning.

Creel survey checks were made by regional fishery management staff and conservation officers. We recorded number of anglers, total hours fished, and species or type of fish caught. Lengths of species or types of fish were also recorded.

To differentiate stocking groups in the creel, we marked Spokane strain rainbow trout with an adipose fin clip and domestic Kamloops rainbow trout with a left ventral fin clip prior to stocking.

To estimate harvest, we used expanded creel census estimates of angler hours by month for April throughout October 1987 (Lindland 1988). We multiplied these hours by catch per hour from the 1991 creel survey to estimate harvest by group by month. We also used size of fish in the creel to differentiate year classes of Spokane rainbow trout when two were represented in the same month.

The Spokane rainbow trout are provided by the U.S. Fish and Wildlife Service's Lower Snake River Compensation Plan resident fish mitigation program.

RESULTS

General

Idaho Department of Fish and Game (IDFG) personnel stocked 119,152 catchable rainbow trout in six Region 2 lowland lakes in 1991 (Table 1).

Region 2 fishery management personnel and conservation officers checked 1,478 anglers at seven Region 2 lowland lakes and reservoirs in 1991. These anglers had fished 3,359 hours to catch 2,735 fish, a catch rate of 0.81 fish/h. The catch consisted of 68% trout, 28% kokanee, and 4% spiny ray and catfish (Table 2).

Winchester Lake

Fingerling Trout Evaluation

Fingerling rainbow trout stocked in Winchester Lake in 1989 showed good growth rates and relatively high abundance five months after stocking. The fingerling stocking program has been diversified (Table 3) in an attempt to augment put-and-grow production into the existing catchable trout program.

We checked 372 anglers that fished 898.5 hours to catch 654 fish (0.73 fish/h) in Winchester Lake (Table 4). The catch consisted of 97.7% trout. The remainder of the catch was bullhead catfish *Ameiurus sp.* and largemouth bass.

Creel survey results from January and April through November showed catchable rainbow trout contributing from 9.3% to 100% of the total monthly trout harvest. Spokane rainbow trout contributed from 0% to 90.7% of the monthly trout harvest. Kamloops rainbow trout contributed from 0% to 16.4% of the monthly trout harvest. Total contribution to the creel during the nine months surveyed at Winchester Lake showed catchable trout, Spokane rainbow trout, and Kamloops rainbow trout contributed 54%, 36%, and 10%, respectively (Table 5). Monthly catch rates for all trout combined ranged from .42 to 1.30 trout/h.

Recording length of marked fish in the creel allowed tracking of the 1990 and 1991 stocking of Spokane rainbow trout (Table 6) and the 1990 stocking of Kamloops rainbow trout (Table 7). None of the 1990 group of Spokane rainbow trout was checked in the creel during June or July 1991. The 1990 Spokane rainbow trout were checked again in the creel in August, September, and October 1991. Their absence is attributed to low sampling effort in the creel census during June and July. Expanded harvest estimates of Spokane rainbow trout are shown in Table 8.

Table 1. Region 2 catchable rainbow trout stocking, 1991.

Lowland lake	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Winchester Lake	--	10,000	14,984	--	--	--	7,600	32,584
Spring Valley Reservoir	--	7,500	15,000	--	--	--	7,500	30,000
Mann Lake	8,400	--	15,000	275 ^a	--	--	7,600	31,000
Soldiers Meadow	--	--	3,008	--	--	--	--	3,008
Elk Creek Reservoir	--	2,610	8,750	275 ^a	--	--	--	11,360
Moose Creek Reservoir	2,480	2,610	3,500	275 ^a	--	--	2,610	<u>11,200</u>
								119,152

^aBroodstock

Table 2. Summary of creel survey findings for Region 2 lowland lakes and reservoirs, 1991.

Lowland lake	Angler	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
Spring Valley R.	542	1,209	623	111	83	0	0	26	0	0	0	843	0.70
Winchester Lake	372	899	345	231	63	0	0	1	0	0	14	654	0.73
Soldiers Meadow	127	224	71	67	0	0	26	0	0	2	0	166	0.74
Mann Lake	127	278	128	0	0	0	0	7	0	26	0	161	0.58
Elk Creek R.	42	77	43	0	0	13	0	0	0	0	3	59	0.77
Moose Creek R.	53	125	53	0	0	0	0	9	0	7	1	70	0.56
Dworshak R.	215	549	34	0	0	0	743	0	5	0	0	782	1.43
Total	1,478	3,359	1,297	409	146	13	769	43	5	35	18	2,735	0.81

RBT = rainbow trout	RS = Spokane strain rainbow trout	K1 = domestic Kamloops rainbow trout
BKT = brook trout	KOK = kokanee salmon	LMB = largemouth bass
SMB = smallmouth bass	CRA = crappie	CAT = channel catfish

Table 3. Fingerling trout stocking in Winchester Lake, 1990-1991.

Date	Species	Mark	Number	No/kg
5/16/90	RS	Adipose clip	34,980	121
10/4/90	K1	Left ventral clip	10,000	17
10/15/90	RBT x CTT	None	5,250	165
5/31/91	RS	Adipose clip	45,500	77
10/3/91	K1	Left ventral clip	10,004	48
10/15/91	RBT x CTT	None	21,000	132

RS = Spokane strain rainbow trout
K1 = domestic Kamloops rainbow trout
RBT x CTT = rainbow x cutthroat

Table 4. Summary of creel survey findings for Winchester Lake, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
1/3/91	3	3	3	0	1	0	0	0	0	0	0	4	1.33
1/26/91	11	23	8	9	2	0	0	0	0	0	0	19	0.83
4/2/91	22	77	7	4	3	0	0	0	0	0	0	14	0.18
4/6/91	20	73	26	21	9	0	0	0	0	0	1	57	0.79
4/9/91	2	6	1	1	0	0	0	0	0	0	0	2	0.33
4/13/91	29	79	51	16	7	0	0	0	0	0	2	76	0.97
4/16/91	8	21	8	3	5	0	0	0	0	0	0	16	0.76
4/20/91	22	51	7	21	3	0	0	0	0	0	0	31	0.61
4/21/91	30	45	12	11	12	0	0	0	0	0	0	35	0.78
4/27/91	15	42	15	3	3	0	0	0	0	0	0	21	0.59
5/3/91	20	43	36	4	7	0	0	0	0	0	0	47	1.11
5/11/91	21	27	16	4	2	0	0	0	0	0	0	22	0.81
5/16/91	20	60	18	9	7	0	0	0	0	0	0	34	0.57
5/30/91	11	26	17	5	0	0	0	1	0	0	0	23	0.88
6/12/91	12	32	11	0	0	0	0	0	0	0	2	13	0.41
6/25/91	2	3	11	0	0	0	0	0	0	0	0	11	3.67
7/6/91	31	89	24	13	0	0	0	0	0	0	9	46	0.52
8/5/91	3	4	1	1	0	0	0	0	0	0	0	2	0.50
8/13/91	9	28	5	5	0	0	0	0	0	0	0	10	0.36
8/19/91	4	7	3	3	0	0	0	0	0	0	0	6	0.86
8/21/91	7	20	5	9	0	0	0	0	0	0	0	14	0.70
8/27/91	10	25	13	12	0	0	0	0	0	0	0	25	1.00
9/7/91	8	17	10	3	0	0	0	0	0	0	0	13	0.76
9/11/91	5	10	5	1	1	0	0	0	0	0	0	7	0.74
9/14/91	12	26	14	14	1	0	0	0	0	0	0	29	1.12
9/29/91	10	15	7	7	0	0	0	0	0	0	0	14	0.93
10/6/91	18	33	4	39	0	0	0	0	0	0	0	43	1.30
11/2/91	7	16	7	13	0	0	0	0	0	0	0	20	1.29

RBT = rainbow trout
BKT = brook trout
SMB = smallmouth bass

RS = Spokane strain rainbow trout
KOK = kokanee salmon
CRA = crappie

K1 = domestic Kamloops rainbow trout
LMB = largemouth bass
CAT = channel catfish

Table 5. Contribution to creel by catchable rainbow trout, Spokane rainbow trout (RS), domestic Kamloop trout (K1), and trout/h (catch per unit effort) (CPUE) on Winchester Lake, 1991.

Month	Catchable (%)	RS (%)	K1 (%)	CPUE
January	48.0	39.0	13.0	0.88
April	52.3	31.3	16.4	0.65
May	69.6	17.6	12.8	0.80
June	100.0	0	0	0.63
July	64.9	35.1	0	0.42
August	47.4	52.6	0	0.68
September	57.1	39.7	3.2	0.93
October	9.3	90.7	0	1.30
November	35.0	65.0	0	1.29
TOTAL	54.0	36.0	10.0	0.73

Table 6. Summary of length frequencies of Spokane rainbow trout examined in the creel, April through October, and an October gill net sample from Winchester Lake, 1991.

Length (cm)	April	May	June	July	August	September	October	October ^a
15-16	0	0	0	10	3	0	0	0
17-18	0	0	0	3	5	1	0	0
19-20	0	0	0	0	7	12	4	1
21-22	1	0	0	0	8	7	23	20
23-24	8	1	0	0	0	2	9	80
25-26	31	0	0	0	0	0	1	19
27-28	25	5	0	0	0	0	0	1
29-30	7	13	0	0	2	0	0	1
31-32	1	2	0	0	1	0	1	0
33-34	0	1	0	0	2	2	0	1
35-36	0	0	0	0	1	1	1	2
37-38	0	0	0	0	0	0	0	1
39-49	0	0	0	0	0	0	0	0

^aSample taken with gill net.

Table 7. Summary of length frequencies of domestic Kamloops rainbow trout examined in the creel, April through October, and an October gill net sample from Winchester Lake, 1991.

Length (cm)	April	May	June	July	August	September	October	October ^a
15-16	0	0	0	0	0	0	0	0
17-18	0	1	0	0	0	0	0	0
19-20	5	0	0	0	0	0	0	0
21-22	5	3	0	0	0	0	0	0
23-24	26	5	0	0	0	0	0	0
25-26	4	5	0	0	0	0	0	0
27-28	1	2	0	0	0	2	0	0
29-30	0	0	0	0	0	0	0	0
31-32	0	0	0	0	0	0	0	1
33-34	0	0	0	0	0	0	0	0
35-36	0	0	0	0	0	0	0	0
37-38	0	0	0	0	0	0	0	0
39-49	0	0	0	0	0	0	0	0

^aSample taken with gill net.

Table 8. Harvest estimate of Spokane rainbow trout from Winchester Lake, April through October 1991.

Month	Effort hours ^a	1990 Plant			1991 Plant		
		CPUE ^b	Expanded harvest estimate	Average length (mm)	CPUE ^b	Expanded harvest estimate	Average length (mm)
April	8,352	0.20	1,704	269	--	--	--
May	10,336	0.14	1,457	296	--	--	--
June	10,688	0.11 ^c	1,176	305	--	--	--
July	5,270	0.09 ^c	474	310	0.15	791	190
August	6,732	0.07	471	347	0.29	1,952	190
September	2,850	0.12	342	337	0.33	941	190
October	3,217	0.06	196	340	0.95	3,056	210
TOTAL			5,821			6,739	

^a From Lindland 1988.

^b Catch per unit effort.

^c Estimates.

During the seven-month interval, we estimated 5,821 Spokane rainbow trout returned from the 1990 plant, a return of 15%. Spokane rainbow from the May 1991 plant began contributing to the creel in July. From July through October 1991, we estimated 6,739 Spokane rainbow trout were caught from the 1991 plant, a return of 14.8%. Biomass harvested during those four months from the 1991 plant was estimated at 616 kg, a return rate of 104% by weight.

We assumed the 1990 plant contributed similarly to the 1991 plant from July through October of their first year in the lake (1990). We adjusted for stocking rate and size between years and combined the harvest estimates (Table 9). Using this method, it is conceivable that a plant could return approximately 30% by number and 600% by weight over 1.6 years without accounting for any harvest during November through March.

Creel survey results showed Kamloops rainbow trout in the catch in April, May, and October (Table 7). The 1990 plant of Kamloops rainbow trout were 16.9/kg (7.7/lb). Considerable harvest probably occurred on these fish prior to the creel survey in April 1991. However, harvest estimates show 3,076 fish harvested at 550 kg. This represents return rates of 31% by number and 93% by weight over the seven-month interval (Table 10).

The rainbow/cutthroat fingerlings stocked in October 1990 were not observed in the creel checks at Winchester Lake in 1991.

Largemouth Bass

We conducted an extensive survey of the largemouth bass population in Winchester Lake in 1990. The survey indicated a healthy, fast-growing population that suffers periodic year class failures. The catch curve estimate of $-Z = 0.882$ was biased due to a violation in the assumption of constant recruitment. The year class failure of 1986 that would have resulted in age 4+ fish in 1990 overestimated natural mortality and influenced a PSD estimate of 19 (Figure 1).

Angler exploitation in 1990 was estimated from five-dollar reward tag returns at 12% (2/17).

We sampled the population again on June 13 and 19, 1991. We collected 489 largemouth bass ranging in size from 50 mm to 470 mm (Figure 2). The year class failure of 1986 was less noticeable as the 1987 year class spread out in the length frequency. However, the year class failure of 1988, age 3+ in 1991, was very evident as it was in 1990. PSD estimate in 1991 was 29, influenced by the lack of age 3+ fish in the 240-280 mm length class.

The strong age 4+ year class allowed us to tag 54 bass 305 mm and larger with five-dollar reward tags. Anglers returned six tags for an exploitation estimate of 11%. This exploitation estimate is very similar to the 1990 estimate of 12%. Both estimates are probably low as consumptive bass angling takes place prior to the mid-June tagging date.

Table 9. Estimated harvest of the 1990 stocking group of Spokane strain rainbow trout in Winchester Lake.

Month	Effort hours ^a	CPUE	Expanded harvest estimate	Average length (mm)	Estimated biomass harvested (kg)
1990					
July	5,270	.12	609	190	48
August	6,732	.22	1,503	190	119
September	2,850	.25	725	190	57
October	3,217	.73	2,353	210	250
November	--	--	--	--	--
December	--	--	--	--	--
1991					
January	--	--	--	--	--
February	--	--	--	--	--
March	--	--	--	--	--
April	8,352	.20	1,704	269	381
May	10,336	.14	1,457	296	435
June	10,688	.11	1,176	305	384
July	5,270	.09	474	310	162
August	6,732	.07	471	347	226
September	2,850	.12	342	337	151
October	3,217	.06	196	340	89
			11,011		2,302

^aLindland 1988.

Table 10. Harvest estimate of domestic Kamloops rainbow trout from Winchester Lake, April through October 1991.

Month	Effort hours ^a	CPUE	1990 Plant		
			Expanded harvest estimate	Average length (mm)	Estimated biomass harvested (kg)
April	8,352	0.19	869	236	129
May	10,336	0.10	1,065	244	175
June	10,688	0.05 ^b	545	260	108
July	5,270	0.04 ^b	242	267	52
August	6,732	0.04 ^b	269	277	65
September	2,850	0.03	86	280	21
October	3,217	--	0	--	0

^aLindland 1988.

^bEstimates.

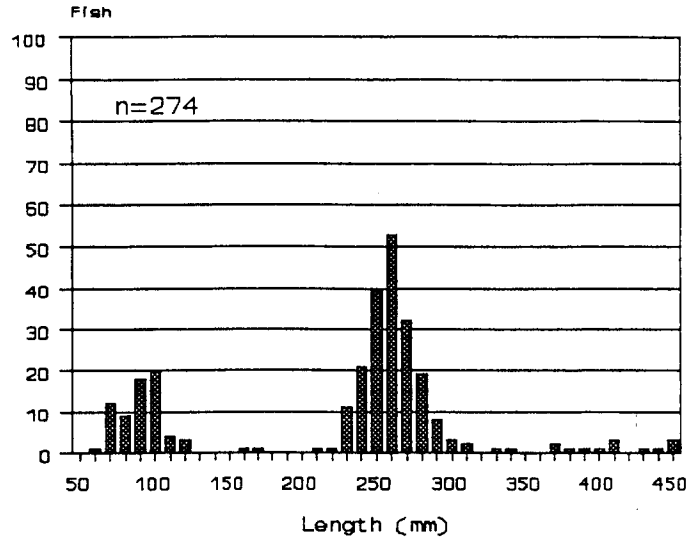


Figure 1. Length frequency of largemouth bass collected by electrofishing in Winchester Lake. Bass were collected on May 10, 14, 29, and June 4, 1990.

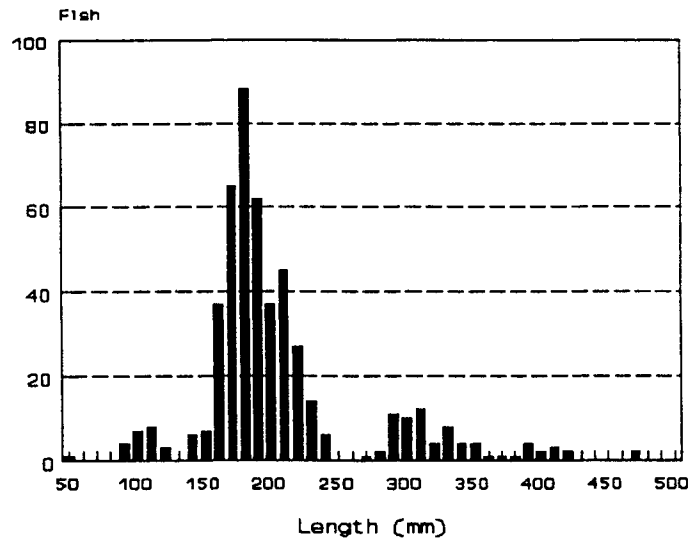


Figure 2. Length frequency of largemouth bass collected by electrofishing in Winchester Lake. Bass were collected on June 13 and June 19, 1991.

Year class failures of largemouth bass at Winchester Lake are most likely weather-related. This is not uncommon to largemouth bass populations in Idaho. Periodic year class failures are probably beneficial to growth and survival by reducing intra-species competition (Dillon 1992).

Spring Valley Reservoir

Spokane strain fingerling rainbow trout stocked in Spring Valley Reservoir in 1989 showed good growth rates and moderate abundance five months after stocking. Spokane and Kamloops rainbow trout are being stocked in Spring Valley Reservoir (Table 11).

We checked 542 anglers that fished 1,208.5 hours to catch 843 fish (0.70 fish/h) in Spring Valley Reservoir (Table 12). The catch consisted of 97% trout and 3% largemouth bass.

Creel survey results from December 1990 through June 1991 and August 1991 through October 1991 showed catchable rainbow trout contributing from 37.5% to 100% of the monthly trout harvest. Spokane rainbow trout contributed from 0% to 62.5% of the monthly trout harvest. Kamloops rainbow trout contributed from 0% to 16.9% of the monthly trout harvest (Table 13). Total contribution to the creel during the 10 months surveyed at Spring Valley Reservoir showed catchable, Spokane, and Kamloops rainbow trout contributed 76.2%, 13.6%, and 10.2%, respectively (Table 13). Monthly catch rates for all trout combined ranged from 0.39 to 2.2 trout/h.

Recording lengths of marked fish in the creel allowed tracking of the 1990 and 1991 stocking of Spokane rainbow trout (Table 14) and the 1990 stocking of Kamloops rainbow trout (Table 15). None of the 1990 group of Spokane rainbow trout was checked in the creel after June 1991. The 1991 group of Spokane rainbow trout began showing up in the creel in August of 1991.

Using the creel census catch rate estimates of Spokane rainbow trout in 1991 and total effort estimates made by Lindland (1988), we expanded a harvest estimate (Table 16). During the seven-month interval we estimated 1,290 Spokane rainbow trout returned from the 1990 plant, a return of 5.2%. Biomass harvested was estimated at 134 kg, a return rate of 64.7% by weight.

Beginning in August 1991, Spokane rainbow trout from the 1991 plant began contributing to the creel. From August through October, we estimated 3,237 Spokane rainbow trout were caught from the 1991 plant, a return rate of 10.3%. Biomass of these fish was estimated at 283 kg, a return rate of 69.5% by weight.

We assumed the 1990 plant contributed similarly to the 1991 plant from August through October of their first year in the lake, then we adjusted for stocking rate and size between years and combined the harvest estimates (Table 17).

Using this method, it is conceivable that a plant could return approximately 15% by number and 170% by weight from August through June without accounting for harvest from November through March. Accounting for November

Table 11. Fingerling trout stocking in Spring Valley Reservoir, 1990-1991.

Date	Species/strain	Mark	Number	#/kg
10/2/90	K1	LV clip	10,070	23
5/16/90	RS	Adipose clip	25,025	121
10/3/91	K1	LV clip	10,004	48
5/31/91	RS	Adipose clip	31,325	77

K1 = domestic Kamloop rainbow trout
 RS = Spokane strain rainbow trout

Table 12. Summary of creel survey findings for Spring Valley Reservoir, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
12/26/90	11	15	16	14	13	0	0	0	0	0	0	43	2.8
12/29/90	11	20	30	4	0	0	0	0	0	0	0	34	1.7
1/9/91	6	16	20	2	8	0	0	0	0	0	0	30	1.8
1/11/91	5	10	13	0	1	0	0	0	0	0	0	14	1.4
1/24/91	2	5	4	3	0	0	0	0	0	0	0	7	1.4
1/27/91	29	57	33	8	2	0	0	1	0	0	0	44	0.7
2/23/91	4	7	10	0	0	0	0	0	0	0	0	10	1.5
3/31/91	48	122	70	6	5	0	0	0	0	0	0	81	0.6
4/4/91	14	35	18	1	5	0	0	0	0	0	0	24	0.6
4/7/91	19	37	5	1	0	0	0	0	0	0	0	6	0.1
4/12/91	21	52	27	7	0	0	0	5	0	0	0	39	0.7
4/14/91	20	50	25	3	5	0	0	2	0	0	0	35	0.7
4/18/91	15	57	20	1	0	0	0	0	0	0	0	21	0.3
4/21/91	44	87	16	6	7	0	0	4	0	0	0	33	0.3
4/24/91	7	13	7	0	1	0	0	0	0	0	0	8	0.6
4/28/91	27	87	9	0	1	0	0	3	0	0	0	13	0.1
5/1/91	8	16	9	0	4	0	0	0	0	0	0	13	0.8
5/3/91	18	32	50	0	1	0	0	1	0	0	0	52	1.6
5/5/91	38	112	35	2	8	0	0	1	0	0	0	46	0.4
5/7/91	19	69	34	0	0	0	0	0	0	0	0	34	0.5
5/10/91	16	21	10	2	0	0	0	0	0	0	0	12	0.5
5/12/91	31	49	29	0	4	0	0	2	0	0	0	35	0.7
5/13/91	8	13	12	0	1	0	0	0	0	0	0	13	1.0
5/15/91	7	11	1	0	11	0	0	0	0	0	0	12	1.0
5/18/91	18	42	18	1	2	0	0	4	0	0	0	25	0.6
5/30/91	2	1	3	0	0	0	0	0	0	0	0	3	3.0
6/2/91	12	16	5	0	0	0	0	0	0	0	0	5	0.3
6/4/91	2	3	4	0	0	0	0	0	0	0	0	4	1.3
6/25/91	5	10	0	0	0	0	0	0	0	0	0	0	0.0
6/27/91	11	30	17	5	3	0	0	0	0	0	0	25	0.8
8/6/91	1	3	1	2	0	0	0	1	0	0	0	4	1.3
8/14/91	8	19	20	0	0	0	0	1	0	0	0	21	1.1
8/19/91	4	4	2	2	0	0	0	0	0	0	0	4	1.0
8/31/91	4	3	0	0	0	0	0	0	0	0	0	0	0.0
9/10/91	4	10	7	4	0	0	0	0	0	0	0	11	1.1
9/11/91	8	6	0	0	1	0	0	0	0	0	0	1	0.1
9/14/91	12	22	25	15	0	0	0	1	0	0	0	41	1.8
9/21/91	12	21	12	12	0	0	0	0	0	0	0	24	1.1
10/5/91	11	27	6	10	0	0	0	0	0	0	0	16	0.6
TOTAL	542	1,209	623	111	83	0	0	26	0	0	0	843	0.7

RBT = rainbow trout
BKT = brook trout
SMB = smallmouth bass

RS = Spokane strain rainbow trout
KOK = kokanee salmon
CRA = crappie

K1 = domestic Kamloop rainbow trout
LMB = largemouth bass
CAT = channel catfish

Table 13. Contribution to creel, by percent, for catchable rainbow trout, Spokane strain rainbow trout (RS), domestic Kamloops rainbow trout (K1), and trout/hr (CPUE) by month on Spring Valley Reservoir, 1990 and 1991.

Month	Catchable	RS	K1	CPUE
1990				
December	46.7	23.4	16.9	2.2
1991				
January	74.5	13.8	11.7	1.1
February	100.0	0.0	0.0	1.5
March	86.4	7.4	6.2	0.7
April	77.0	11.5	11.5	0.4
May	84.8	2.1	13.1	0.7
June	76.5	14.7	8.8	0.6
July	--	--	--	--
August	85.2	14.8	0.0	0.9
September	56.8	41.9	1.3	1.3
October	37.5	62.5	0.0	0.6
Totals	76.2	13.6	10.2	

Table 14. Summary of length frequency of Spokane strain rainbow trout examined in the creel from Spring Valley Reservoir, April through October, 1991.

Total Length (cm)	APR	MAY	JUN	JUL	AUG	SEP	OCT
15-16	0	0	1	0	0	0	0
17-18	0	0	1	0	3	18	1
19-20	1	0	3	0	0	11	3
21-22	6	1	1	0	1	2	6
23-24	5	1	0	0	0	0	0
25-26	2	3	0	0	0	0	0
27-28	1	0	0	0	0	0	0

Table 15. Summary of length frequency of domestic Kamloop rainbow trout examined in the creel from Spring Valley Reservoir, April through October, 1991.

Total Length (cm)	APR	MAY	JUN	JUL	AUG	SEP	OCT
15-16	0	0	0	0	0	0	0
17-18	5	1	0	0	0	0	0
19-20	9	18	0	0	0	0	0
21-22	3	10	0	0	0	1	0
23-24	1	0	0	0	0	0	0
25-26	1	0	3	0	0	0	0
27-28	0	0	0	0	0	0	0

Table 16. Harvest estimate of Spokane strain rainbow trout from Spring Valley Reservoir, April-October 1991.

Month	Effort hours ^a	1990 Plant			1991 Plant		
		CPUE	Expanded harvest estimate	Average length (mm)	CPUE	Expanded harvest estimate	Average length (mm)
April	7,068	0.04	283	235	0.00	0	0
May	8,372	0.01	117	248	0.00	0	0
June	10,468	0.09	890	193	0.00	0	0
July	4,136	0.00	0	0	0.00	0	0
August	3,660	0.00	0	0	0.14	512	190
September	2,886	0.00	0	0	0.53	1,530	190
October	3,145	0.00	0	0	0.38	1,195	210

^aLindland 1988.

Table 17. Harvest estimate of the 1990 stocking group of Spokane strain rainbow trout from Spring Valley Reservoir, August 1990 through October 1991.

Month	1990 Plant			
	Effort hours ^a	CPUE	Expanded harvest estimate	Average length (mm)
August	3,660	.11	410	190
September	2,886	.42	1,224	190
October	3,145	.30	956	210
November	--	--	--	--
December	--	--	--	--
January	--	--	--	--
February	--	--	--	--
March	--	--	--	--
April	7,068	.04	283	235
May	8,372	.01	117	248
June	10,468	.09	890	193
July	4,136	--	--	--
August	3,660	--	--	--
September	2,886	--	--	--
October	3,145	--	--	--
Total			3,880	

^aLindland 1988.

through March would increase the return rate considerably, as Table 13 shows that contribution to the creel by Spokane rainbow trout during those months can be substantial.

Creel survey results showed Kamloops rainbow trout in the catch in December 1990, January, March through June, and September 1991. The 1990 plant of Kamloops rainbow trout was 23/kg. Considerable harvest probably occurred on those fish prior to the creel survey in April 1991 as indicated in Table 13. However, estimates showed 1,522 Kamloops rainbow trout harvested at 202 kg from April through October 1991. This represents return rates of 15% by number and 47% by weight in the three months the harvest was expanded (Table 18).

Soldiers Meadow Reservoir

Fingerling trout stocked in Soldiers Meadow Reservoir in 1990 showed relatively slow growth and high abundance. Early-spawning kokanee showed higher growth rates (Table 19). Stocking rates of both fish were reduced in 1991 (Table 20).

We checked 127 anglers that fished 224 hours to catch 166 fish (0.72 fish/h) in Soldiers Meadow Reservoir (Table 21). The catch consisted of 99% salmonids and 1% black crappie.

Creel survey results from April through October 1991 showed catchable rainbow trout and Spokane rainbow trout contributing from 0% to 100% of the monthly salmonid harvest. Early kokanee contributed from 0% to 25.5% of the monthly salmonid harvest (Table 22).

Total contribution to the creel during the seven months surveyed at Soldiers Meadow Reservoir showed catchable trout, Spokane rainbow trout, and kokanee contributed 43.3%, 40.8%, and 15.9%, respectively (Table 22). Monthly catch rates ranged from 0.18 to 2.0 salmonids per hour.

Length frequencies of Spokane rainbow trout and kokanee checked in the creel survey are shown in Tables 23 and 24.

Mann Lake

Spokane strain rainbow trout were not present in the 1991 creel survey findings. Catchable rainbow trout provided 100% of the trout harvest in Mann Lake.

We checked 127 anglers who fished 277.5 hours to catch 161 fish (0.58 fish/h) in Mann Lake (Table 25).

Table 18. Harvest estimate of domestic Kamloop rainbow trout from Spring Valley Reservoir, April through October 1991.

Month	1990 Plant			
	Effort hours ^a	CPUE	Expanded harvest estimate	Average length (mm)
April	7,068	0.05	318	203
May	8,372	0.08	670	206
June	10,468	0.05	534	260
July	4,136	--	--	--
August	3,660	--	--	--
September	2,886	--	--	--
October	3,145	--	--	--
Total:			1,522	

^aLindland 1988.

Table 19. Summary of gill net samples from Soldiers Meadow Reservoir, 1990-1991.

Length (mm)	<u>10/5/90</u>	<u>5/31/91</u>		<u>10/23/91</u>	
	RS	RS	KE	RS	KE
150	1	0	0	4	0
160	17	1	0	10	3
170	50	3	2	20	3
180	15	5	0	2	0
190	11	1	5	0	0
200	1	14	8	0	1
210	0	2	6	2	2
220	0	2	3	0	0
230	0	0	1	1	0

RS = Spokane strain rainbow trout
 KE = Kokanee - early

Table 20. Fingerling stocking in Soldiers Meadow Reservoir, 1990-1991.

Date	Species	Mark	Number	#/kg
5/1/90	KE	None	20,025	165
5/16/90	RS	Adipose clip	33,706	127
5/8/91	KE	None	11,200	176
5/31/91	RS	Adipose clip	21,175	77
6/24/91	KL	Triploid	5,430	865

KE = kokanee - early

RS = Spokane strain rainbow trout

KL = kokanee - late

Table 21. Summary of creel survey findings for Soldiers Meadow Reservoir, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
4/27/91	2	1	2	0	0	0	0	0	0	0	0	2	2.00
5/4/91	8	19	17	5	0	0	0	0	0	0	0	22	1.16
6/8/91	50	62	10	13	0	0	0	0	0	0	0	23	0.37
6/12/91	7	11	3	2	0	0	12	0	0	0	0	17	1.55
6/24/91	2	6	1	6	0	0	0	0	0	0	0	7	1.17
7/6/91	16	50	19	21	0	0	10	0	0	0	0	50	1.00
8/5/91	6	17	6	1	0	0	0	0	0	0	0	7	0.41
8/13/91	4	4	1	0	0	0	0	0	0	0	0	1	0.25
8/19/91	6	22	8	7	0	0	2	0	0	0	0	17	0.77
8/21/91	3	1	1	0	0	0	0	0	0	0	0	1	1.00
8/27/91	13	22	2	5	0	0	2	0	0	2	0	11	0.50
9/7/91	6	4	0	7	0	0	0	0	0	0	0	7	1.75
10/6/91	4	6	1	0	0	0	0	0	0	0	0	1	0.18
TOTAL	127	224	71	67	0	0	26	0	0	2	0	166	0.74

RBT = rainbow trout	RS = Spokane strain rainbow trout	K1 = domestic Kamloop rainbow trout
BKT = brook trout	KOK = kokanee salmon	LMB = largemouth bass
SMB = smallmouth bass	CRA = crappie	CAT = channel catfish

Table 22. Contribution to creel by catchable trout, Spokane rainbow trout (RS), early kokanee (KE), and trout/h (CPUE) on Soldiers Meadow, 1991.

Month	Catchable (%)	RS (%)	KE (%)	CPUE
April	100.0	0.0	0.0	2.00
May	77.3	22.7	0.0	1.16
June	29.8	44.7	25.5	0.58
July	38.0	42.0	20.0	1.00
August	51.4	37.2	11.4	0.53
September	0.0	100.0	0.0	1.75
October	100.0	0.0	0.0	0.18
TOTAL	43.3	40.8	15.9	.74

Table 23. Summary of length frequencies of Spokane rainbow trout examined in the creel from Soldiers Meadow Reservoir, 1991.

Length (mm)	May	June	July	August	September	October
17-18	4	2	4	0	1	0
19-20	1	12	15	9	4	0
21-22	0	4	0	2	1	0
23-24	0	2	0	2	1	0
25-26	0	1	0	0	0	0

Table 24. Summary of length frequencies of early kokanee examined in the creel from Soldiers Meadow Reservoir, 1991.

Length (mm)	May	June	July	August	September	October
19-20	0	2	0	0	0	0
21-22	0	7	6	0	0	0
23-24	0	3	3	1	0	0
25-26	0	0	0	3	0	0

Table 25. Summary of creel survey findings for Mann Lake, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
1/23/91	2	2	4	0	0	0	0	0	0	0	0	4	2.00
2/27/91	10	14	24	0	0	0	0	0	0	0	0	24	1.71
4/2/91	4	7	2	0	0	0	0	0	0	0	0	2	0.29
4/6/91	12	36	3	0	0	0	0	0	0	0	0	3	0.08
4/12/91	10	24	4	0	0	0	0	0	0	0	0	4	0.17
4/20/91	5	11	0	0	0	0	0	2	0	1	0	3	0.27
4/27/91	7	12	6	0	0	0	0	0	0	0	0	6	0.50
5/4/91	21	69	8	0	0	0	0	4	0	0	0	12	0.17
5/11/91	11	16	8	0	0	0	0	0	0	0	0	8	0.50
5/16/91	6	23	3	0	0	0	0	0	0	25	0	28	1.22
5/30/91	4	6	5	0	0	0	0	0	0	0	0	5	0.83
8/19/91	3	4	3	0	0	0	0	0	0	0	0	3	0.86
8/27/91	3	8	8	0	0	0	0	0	0	0	0	8	1.00
9/7/91	8	21	11	0	0	0	0	0	0	0	0	11	0.52
9/11/91	6	10	17	0	0	0	0	0	0	0	0	17	1.70
9/29/91	7	8	11	0	0	0	0	1	0	0	0	12	1.50
10/12/91	5	4	10	0	0	0	0	0	0	0	0	10	2.86
11/17/91	3	4	1	0	0	0	0	0	0	0	0	1	0.29
TOTAL:	127	278	128	0	0	0	0	7	0	26	0	161	0.58

RBT = rainbow trout
 BKT = brook trout
 SMB = smallmouth bass
 RS = Spokane strain rainbow trout
 KOK = kokanee
 CRA = crappie
 K1 = domestic Kamloop rainbow trout
 LMB = largemouth bass
 CAT = brown bullhead

Elk Creek Reservoir

We stocked 1,650 Lahontan cutthroat trout in Elk Creek Reservoir in May 1990 and 2,814 in May 1991. Average size was 14/kg.

We checked 42 anglers who fished 77 hours to catch 72 fish (.94 fish/h) in Elk Creek Reservoir. The catch consisted of 96% trout and 4% brown bullheads *Ictalurus nebulosus*. Lahontan cutthroat trout provided 19% of the trout creel (Table 26). All Lahontan cutthroat trout were from the 1991 plant and averaged 210 mm long.

Bass

We sampled 96 largemouth and 17 smallmouth bass in Elk Creek Reservoir and found PSD of 42 and 54, respectively.

Dworshak Reservoir

We checked 215 anglers that fished 548.5 hours to catch 782 fish (1.43 fish/h) in Dworshak Reservoir. The catch was dominated by kokanee, as most of the anglers checked were trolling specifically for kokanee (Table 27).

Moose Creek Reservoir

We checked 53 anglers that fished 125 hours to catch 70 fish (.56 fish/h) on Moose Creek Reservoir. The catch consisted of 76% rainbow trout and 24% warmwater fish (Table 28).

Table 26. Summary of creel survey findings for Elk Creek Reservoir, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	CUTT	LMB	SMB	CRA	CAT	Total	CPUE
2/9/91	1	4	1	0	0	4	0	0	0	0	0	5	1.25
6/15/91	7	20	2	0	0	7	0	0	0	0	0	9	0.45
6/25/91	5	10	1	0	0	1	3	0	0	0	1	6	0.60
7/5/91	5	8	1	0	0	0	3	0	0	0	2	6	0.75
8/19/91	4	8	4	0	0	0	3	0	0	0	0	7	0.88
9/11/91	3	4	3	0	0	0	0	0	0	0	0	3	0.86
9/14/91	3	4	6	0	0	0	0	0	0	0	0	6	1.50
9/21/91	5	10	14	0	0	0	4	0	0	0	0	18	1.80
10/5/91	8	6	7	0	0	1	0	0	0	0	0	8	1.45
10/13/91	1	4	4	0	0	0	0	0	0	0	0	4	1.00
TOTAL:	42	77	43	0	0	13	13	0	0	0	3	72	0.94

RBT = rainbow trout
 BKT = brook trout
 SMB = smallmouth bass

RS = Spokane strain rainbow trout
 CUTT = cutthroat trout
 CRA = crappie

K1 = domestic Kamloops rainbow trout
 LMB = largemouth bass
 CAT = brown bullhead

Table 27. Summary of creel survey findings for Dworshak Reservoir, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
4/6/91	16	56	0	0	0	0	70	0	0	0	0	70	1.25
4/13/91	35	95	18	0	0	0	35	0	1	0	0	54	0.57
4/14/91	13	27	0	0	0	0	4	0	0	0	0	4	0.15
5/24/91	28	39	6	0	0	0	30	0	0	0	0	36	0.94
5/25/91	45	137	1	0	0	0	288	0	1	0	0	290	2.12
5/26/91	72	184	0	0	0	0	315	0	3	0	0	318	1.73
6/1/91	6	12	9	0	0	0	1	0	0	0	0	10	0.83
TOTAL:	215	549	34	0	0	0	743	0	5	0	0	782	1.43

RBT = rainbow trout
 BKT = brook trout
 SMB = smallmouth bass
 RS = Spokane strain rainbow trout
 KOK = kokanee
 CRA = crappie
 K1 = domestic Kamloop rainbow trout
 LMB = largemouth bass
 CAT = brown bullhead

Table 28. Summary of creel survey findings for Moose Creek Reservoir, 1991.

Date	Anglers	Total hours	RBT	RS	K1	BKT	KOK	LMB	SMB	CRA	CAT	Total	CPUE
2/21/91	2	4	3	0	0	0	0	0	0	0	0	3	0.75
5/3/91	1	3	0	0	0	0	0	0	0	0	0	0	0.00
6/2/91	1	1	0	0	0	0	0	0	0	0	0	0	0.00
6/15/91	17	34	13	0	0	0	0	5	0	2	0	20	0.60
6/25/91	1	1	0	0	0	0	0	0	0	0	0	0	0.00
7/5/91	13	36	24	0	0	0	0	1	0	0	0	25	0.70
8/6/91	1	2	0	0	0	0	0	0	0	0	0	0	0.00
8/19/91	4	11	0	0	0	0	0	3	0	5	0	8	0.76
8/31/91	3	6	0	0	0	0	0	0	0	0	0	0	0.00
9/11/91	2	5	0	0	0	0	0	0	0	0	0	0	0.00
9/14/91	2	8	9	0	0	0	0	0	0	0	1	10	1.25
10/5/91	4	10	1	0	0	0	0	0	0	0	0	1	0.10
10/13/91	2	6	3	0	0	0	0	0	0	0	0	3	0.50
TOTAL:	53	125	53	0	0	0	0	9	0	7	1	70	0.56

RBT = rainbow trout

BKT = brook trout

SMB = smallmouth bass

RS = Spokane strain rainbow trout

KOK = kokanee

CRA = crappie

K1 = domestic Kamloops rainbow trout

LMB = largemouth bass

CAT = brown bullhead

^a Catch per unit effort.

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JOB PERFORMANCE REPORT

State of: Idaho Name: Regional Fisheries
Management Investigations

Project: F-71-R-16 Title: Region 2 Rivers and Streams
Investigations

Job No.: 2-c

Period Covered: July 1, 1990 to June 30, 1991

ABSTRACT

Twenty-two streams were surveyed by snorkeling techniques to add to an on-going database for both anadromous and resident fish populations.

Established snorkeling transects were monitored for the third year in the Little North Fork of the Clearwater River. Cutthroat trout *Oncorhynchus clarki* densities were found to be as consistently low as seen in 1988 and 1990.

We collected 345 smallmouth bass *Micropterus dolomieu* with electrofishing gear in the Snake River below Hells Canyon Dam. We tagged 174 bass 200 mm and larger with five-dollar reward tags to estimated exploitation. Proportional Stock Density was 36 below and 51 above river kilometer 286. Angler exploitation was estimated at 21% below river kilometer 286. Angler exploitation was estimated at 9% above river kilometer 342 (Pittsburg Landing).

We tagged 23 white sturgeon *Acipenser transmontanus* in the Snake River between Lewiston, Idaho and Hells Canyon Dam. Size range of tagged sturgeon was 33 to 277 cm.

Approximately 20% of the trout harvested in the lower Clearwater and Salmon rivers originated from October rainbow trout *O. mykiss* fingerling plants.

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OBJECTIVES

1. Continue to monitor anadromous and resident fish densities in selected regional streams using snorkeling techniques.
2. Tag white sturgeon *Acipenser transmontanus* in the Snake and Salmon rivers.
3. Continue impromptu angler creel checks on various rivers and streams in Region 2.
4. Assess the smallmouth bass *Micropterus dolomieu* population and fishery in the Snake River below Hells Canyon Dam.
5. Evaluate the resident trout put-and-grow fingerling program in the lower Clearwater and Salmon rivers.

SALMONID POPULATION TREND MONITORING

Methods

We used standard snorkeling techniques to monitor fish densities in regional rivers and streams. Snorkeling was done in late summer when streams were low, clear, and accessible.

Small streams were snorkeled upstream with one or two observers depending on stream width. Larger streams and river corridors were snorkeled free-floating downstream with four to six observers, depending on corridor width.

Results

Thirty-four streams were surveyed in Region 2 by snorkeling techniques to add to an ongoing database for both anadromous and resident fish populations.

Established snorkeling transects were monitored for the third year in the Little North Fork of the Clearwater River. Cutthroat trout *Oncorhynchus clarki* densities were found to be as consistently low as seen in 1988 and 1990 (Table 1). A summary of findings from 22 other streams being monitored by snorkeling counts in Region 2 is shown in Table 2.

Table 1. Summary of fish densities, determined by snorkeling, in the Little North Fork Clearwater River, 1988-1991.

Stream	Date	Relative location	Fish densities/100 m ²		
			Rainbow	Cutthroat	Total trout
Adair Creek	9/90	Lower stream section	1.14	0.0	1.14
	7/91	Lower stream section	0.0	3.67	3.67
Bear Creek	8/90	Lower stream section	24.5	0.0	24.5
Canyon Creek	8/90	Lower stream section	0.36	1.63	1.99
Foehl Creek	8/90	Lower stream section	0.45	2.26	2.71
	8/91	Lower stream section	6.78	0.56	7.24
Larkin Creek	8/90	Lower stream section	11.6	0.0	11.6
Montana Creek	9/90	Lower stream section	0.0	0.76	0.76
	7/91	Lower stream section	0.0	17.05	17.05
Rutledge Creek	9/90	Lower stream section	9.84	0.0	9.84
	7/91	Lower stream section	0.0	0.0	0.0
Sawtooth Creek	8/90	Lower stream section	2.80	3.92	6.72
	8/91	Lower stream section	0.0	0.0	0.0
Spotted Louis Creek	9/90	Lower stream section	1.81	5.42	7.23
	7/91	Lower stream section	0.0	21.3	21.3
Twin Creek	9/90	Lower stream section	0.0	0.0	0.0
	7/91	Lower stream section	0.0	10.79	10.79
Mainstem pools above Bear Creek	8/88	22 pools upstream to Canyon Creek	0.44	0.15	0.59
	8/90	9 pools upstream to Canyon Creek	0.71	1.14	1.85
	8/91	3 pools upstream to Foehl Creek	0.0	1.39	1.39
Mainstem pools below Bear Creek	8/88	9 pools downstream to Minnesaka Creek	0.16	0.18	0.34

Table 2. Summary of fish densities determined by snorkeling established transects in Region 2 streams, 1991. Densities shown are fish per 100 m².

Stream	Steelhead			Resident	Chinook		Cutthroat		Mountain whitefish	Bull trout
	Age 0	Age 1	Age 2		Age 0	Age 1	≤305 mm	>305 mm		
South Fork, Clearwater River										
John's Creek I, lower	7.10	9.60	2.80	0.00	0.30	0.00	0.00	0.00	0.60	0.00
John's Creek II, upper	0.63	4.72	2.04	0.00	0.00	0.00	0.16	0.00	0.00	0.63
Selway River										
Moose Creek	1.86	1.21	0.55	0.00	0.00	2.30	0.55	0.11	0.22	0.00
East Fork, Moose Creek	1.53	2.41	1.99	0.19	2.13	0.00	1.39	0.19	1.02	0.00
North Fork, Moose Creek	3.92	3.24	1.60	0.19	0.44	0.15	1.02	0.19	0.39	0.00
Running Creek	1.15	0.92	0.30	0.00	0.00	0.30	0.63	0.00	0.37	0.06
Bear Creek	0.31	0.00	0.10	0.05	0.10	0.15	1.05	0.10	2.21	0.05
Three Links Creek	1.70	11.88	2.71	0.34	0.00	0.00	1.70	0.68	0.34	0.00
Otter Creek	5.61	8.42	2.81	0.94	0.00	0.00	0.47	0.00	0.00	0.00
Lochsa River										
Warm Springs Creek	3.50	2.92	0.93	0.58	0.23	0.58	0.23	0.35	0.00	0.00
Brushy Fork Creek	3.21	3.52	1.53	1.99	0.00	0.15	0.00	0.00	0.00	0.00
Crooked Fork Creek	0.16	0.00	0.00	0.00	0.11	0.58	0.00	0.11	0.00	0.21
Old Man Creek	5.92	16.57	14.20	4.14	0.00	0.00	2.37	0.00	0.00	0.00
Fish Creek	12.53	11.00	3.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Post Office Creek	8.08	2.97	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Clearwater River										
Lochsa River, lower	0.25	0.17	0.14	0.06	0.09	0.07	0.06	0.04	0.97	0.00
Lochsa River, upper	1.01	0.40	0.39	0.07	0.35	0.31	0.25	0.33	1.35	0.01
Salmon River										
Whitebird Creek	16.06	15.16	5.66	0.91	0.00	0.00	0.00	0.00	0.00	0.00
Slate Creek	12.52	6.57	2.12	0.95	0.16	0.43	0.07	0.03	0.00	0.03
John Day Creek	1.04	8.01	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Race Creek	6.47	6.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Skookumchuck Creek	8.79	2.49	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Snake River										
Granite Creek	6.31	7.19	0.70	0.00	0.00	0.00	0.35	0.00	0.00	0.00
Sheep Creek	10.80	6.77	1.44	0.14	0.00	0.00	0.00	0.00	0.00	0.00

STURGEON TAGGING

Methods

We sampled white sturgeon with traditional hook and line methods. Fish were measured for fork length and total length. Spaghetti tags were inserted at the posterior base of the dorsal fin and tied in a loose loop. Passive Integrated Transponder (PIT) tags were inserted in the left side of the fish, just below the base of the dorsal fin, approximately mid-line of the dorsal fin. Fish were inspected for previous marks and hook scars.

Results

We tagged 23 white sturgeon in the Snake River between Lewiston and Hells Canyon Dam. We tagged three white sturgeon in the Salmon River below Riggins. Sturgeon ranged in size from 33 to 277 cm (13 in to 9 ft 1 in) (Table 3).

CREEL SURVEY

Methods

Region 2 fish management personnel and conservation officers performed spot check creel surveys throughout Region 2 in 1991. Total angler hours, fish caught, and fish kept were recorded. Fish were separated by species or differentiated by mark on the form. Fish species or mark groups were also recorded by 2 cm size groups.

Results

We checked 367 anglers who fished 768.75 hours on rivers in Region 2. Anglers reportedly caught 552 game fish, an average catch rate of .72 fish/h (Table 4).

SNAKE RIVER SMALLMOUTH BASS

Methods

We sampled smallmouth bass in the Snake River using pulsed D.C. current from a portable generator and a Coffelt VVP-2E pulsator. Booms and electrodes were mounted on a 5.5-m aluminum boat. Sampling took place during daylight hours to avoid safety hazards.

Table 3. Summary of white sturgeon tagged in Region 2 rivers in 1991.

Floy tag	PIT tag	Total length (cm)	River	River kilometer	Date
1701	7F7F403D7F	71	Snake	365	6/24/91
1702	7F7F402C31	191	Snake	362	6/24/91
1703	7F7F40234F	33	Snake	365	8/28/91
1704	7F7F403B1B	160	Snake	282	8/16/91
1705	7F7F403458	77	Snake	362	6/24/91
1706	7F7F40396D	71	Snake	382	8/29/91
1707	7F7F403141	208	Snake	290	8/23/91
1708	7F7F40387B	97	Snake	382	8/29/91
1709	7F7F403130	196	Salmon	21	8/14/91
1710	7F7F403618	71	Snake	286	9/7/91
1711	7F7F403E2D	151	Salmon	27	8/14/91
1712	7F7F401D2C	40	Snake	284	9/7/91
1713	7F7F403COE	182	Snake	305	8/23/91
1714	7F7F403673	126	Salmon	30	8/14/91
1715	7F7F402C69	180	Snake	264	6/11/91
1716	7F7F402BOE	170	Snake	365	6/25/91
1717	7F7F40285A	155	Snake	260	7/24/91
1718	7F7F403C35	142	Snake	365	6/25/91
1719	7F7F365102	277	Snake	382	6/25/91
1720	7F7F402F69	249	Snake	297	8/23/91
1721	7F7F403B19	211	Snake	367	7/14/91
1722	7F7F3F5547	153	Snake	362	7/14/91
1723	7F7F402B1B	243	Snake	362	6/29/91
1724		114	Snake	362	6/29/91
1725	7F7F402C7A	127	Snake	378	6/24/91
	7F7F402272	153	Snake	278	9/13/91

Table 4. Summary of impromptu creel surveys in Region 2 rivers, 1991.

Date	Anglers	Total hours	CTT	RBT	RS	K1	SH SMOLT	BKT	BULL	KOK	WF	SMB	CAT	STR	TOTAL	CPUE
Clearwater River																
6/8/91	2	4	0	2	0	0	0	0	0	1	1	0	0	0	4	1.00
7/10/91	7	11	0	0	0	0	1	0	0	0	0	0	0	0	1	0.09
7/14/91	6	10	0	1	0	1	3	0	0	0	0	3	0	0	8	0.80
7/27/91	8	7	0	1	0	1	2	0	0	0	1	0	0	0	5	0.71
8/4/91	8	11.5	0	0	0	0	5	0	0	0	0	0	0	0	5	0.43
8/14/91	10	6.75	0	0	0	0	2	0	0	0	0	1	0	0	3	0.44
8/15/91	4	6.5	0	0	2	0	0	0	0	0	0	0	0	0	2	0.31
8/22/91	2	3	0	0	0	1	0	0	0	0	0	0	0	0	1	0.33
8/22/91	13	32	0	6	1	3	5	0	0	0	0	0	0	0	15	0.47
9/1/91	10	35	0	1	0	0	0	0	0	0	0	2	0	0	3	0.09
9/15/91	14	37	0	0	0	0	3	0	0	0	0	0	0	0	3	0.08
9/22/91	13	40	0	3	0	0	0	0	0	0	0	0	0	0	3	0.08
97		203.75	0	14	3	6	21	0	0	1	2	6	0	0	53	0.26
North Fork Clearwater River																
3/30/91	17	34	0	0	0	0	0	0	0	0	38	0	0	0	38	1.12
5/25/91	19	15.5	23	19	0	0	0	0	0	0	0	0	0	0	23	1.48
5/25/91	32	85	13	1	0	0	0	0	3	0	0	0	0	0	17	0.20
5/26/91	3	1	3	0	0	0	0	0	0	0	0	0	0	0	3	3.00
5/26/91	3	3	0	0	0	0	0	0	0	3	0	0	0	0	3	1.00
6/23/91	11	20	3	2	0	0	0	0	1	0	0	0	0	0	6	0.30
6/29/91	14	5	2	1	0	0	0	0	1	0	0	0	0	0	4	0.80
99		163.5	44	4	0	0	0	0	5	3	38	0	0	0	94	0.57
South Fork Clearwater River																
5/25/91	9	16	0	0	0	0	15	0	1	0	0	0	0	0	16	1.00
5/26/91	9	16	0	0	0	0	9	0	0	0	0	0	0	0	9	2.25
5/28/91	2	6	0	0	0	0	9	0	0	0	0	0	0	0	9	1.50
6/1/91	1	1	0	2	0	0	2	0	0	0	0	0	0	0	4	4.00
6/8/91	4	3	0	0	0	0	6	0	0	0	0	0	0	0	6	2.00
7/6/91	3	2	0	0	0	0	5	0	0	0	0	0	0	0	5	2.50
25		32	0	2	0	0	46	0	1	0	0	0	0	0	49	1.53
Lochsa River, lower																
5/25/91	7	19	5	0	0	0	0	0	0	0	2	0	0	0	7	0.37
3/26/91	3	15	7	1	0	0	0	0	2	0	5	0	0	0	15	1.00
6/22/91	4	14	3	0	0	0	0	0	1	0	3	0	0	0	7	0.50
14		48	15	1	0	0	0	0	3	0	10	0	0	0	29	0.60

Table 4. Continued.

Date	Anglers	Total hours	CTT	RBT	RS	K1	SH SMOLT	BKT	BULL	KOK	WF	SMB	CAT	STR	TOTAL	CPUE
Selway River, lower																
5/25/91	12	27.5	1	2	0	0	0	0	0	0	0	0	0	0	3	0.11
5/26/91	20	47	9	1	0	0	0	0	2	0	4	0	0	0	16	0.34
6/15/91	3	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0.50
35		76.5	10	3	0	0	0	0	2	0	5	0	0	0	20	0.26
Lochsa River, catch and release																
7/13/91	6	7.5	8	0	0	0	0	0	0	0	0	0	0	0	8	1.07
7/14/91	4	12	38	0	0	0	0	0	0	0	0	0	0	0	30	3.17
7/22/91	3	24	28	3	0	0	0	0	0	0	0	0	0	0	31	1.29
7/27/91	4	2.5	9	0	0	0	0	0	0	0	0	0	0	0	9	3.60
17		46	83	3	0	0	0	0	0	0	0	0	0	0	86	1.87
Snake River																
4/17/91	12	36.5	0	0	0	0	0	0	0	0	0	22	0	0	22	0.60
4/19/91	2	14	0	0	0	0	0	0	0	0	0	6	0	0	6	0.43
4/21/91	30	87	0	0	0	0	0	0	0	0	0	145	1	4	150	1.72
4/22/91	3	12	0	0	0	0	0	0	0	0	0	10	0	0	10	0.83
6/19/91	5	7	0	0	0	0	0	0	0	0	0	6	0	0	6	0.86
6/23/91	15	15	0	0	0	0	0	0	0	0	0	24	0	0	24	1.60
7/1/91	9	19.5	0	0	0	0	0	0	0	0	0	3	0	0	3	0.15
7/22/91	4	8	0	1	0	0	0	0	0	0	0	5	0	0	6	0.75
80		199	0	1	0	0	0	0	0	0	0	216	1	4	221	1.11
367		768.75	152	27	3	6	67	0	11	4	55	222	1	4	552	0.72

CTT = Cutthroat trout
 RBT = Rainbow trout
 RS = Spokane strain rainbow trout
 K1 = Domestic Kamloops rainbow trout
 SH SMOLT = Steelhead trout smolt
 BKT = Brook trout
 BULL = Bull trout
 KOK = Kokanee salmon
 WF = Whitefish
 CAT = Catfish
 SMB = Smallmouth bass
 STR = Sturgeon

We sampled on April 19, 23, and 24; May 1, 2, and 30; and June 6. Sampling areas were segmented into three sections. The lower section starts at the confluence of the Snake and Clearwater rivers (river kilometer [rkm] 222.5) to the Washington/Oregon state line (rkm 280). The middle section is between rkm 280 and Pittsburg Landing (rkm 343). The upper section is from rkm 343 to Hells Canyon Dam (rkm 395).

We tagged bass 200 mm and larger with five-dollar reward floy anchor tags. Returned tags were used to estimate angler exploitation and fish movement.

Age and growth estimates were made from scale analysis. Scales were taken where the end of the pectoral fin extends up the side of the fish. Scales were dried and cleaned. Impressions were made in acetate slides using a heated press. Impressions were viewed on a microfiche reader. Where possible, we read at least 25 scales selected throughout the length distribution of each age class. This age distribution was then applied to the total length distribution sample to produce a population age frequency.

Length at age was back-calculated using the formula:

$$L^1 = \frac{C + S^1}{S(L - C)}$$

Where: S^1 = length of scale radius to annulus
 S = length of total scale radius
 L = length of fish at time of scale collection
 L^1 = length of fish when annulus was formed

We calculated a catch curve by plotting the log of the frequency of age classes against age (Everhart Young 1981).

Results

We collected 345 smallmouth bass with electrofishing gear in the Snake River between Lewiston and Hells Canyon Dam (Table 5). We tagged 174 bass 200 mm and larger (Table 6). Sampling dates were divided into early or late. Early samples were collected between April 20 and May 2. Late samples were collected from May 30 through June.

The most extensive sampling was done below rkm 280. Early season sampling below rkm 280 provided a Proportional Stock Density (PSD) of 36. Late season sampling below rkm 280 provided a PSD of 6. The limited sampling above rkm 343 was done in the late season and provided a PSD of 51 (Table 5).

Table 5. Comparison of length frequencies for smallmouth bass from the Snake River below Hells Canyon Dam. Samples are segregated by area (above or below the Washington state lien [rkm 280]) and by time. Early samples were collected from April 20 through May 2 and late samples were collected from May 30 through June 30, 1991.

Length	Above WA	Below WA		Total	Total	Total
	late	late	early	early	late	
50	0	0	0	0	0	0
60	0	0	0	0	0	0
70	0	0	0	0	0	0
80	0	0	1	1	0	1
90	0	0	1	1	0	1
100	0	0	1	1	0	1
110	0	2	0	0	2	2
120	0	1	1	1	1	2
130	0	5	6	6	5	11
140	3	15	4	4	18	22
150	2	11	10	10	13	23
160	1	7	3	3	8	11
170	0	2	4	4	2	6
180	0	3	3	3	3	6
190	1	9	4	4	10	14
200	0	13	13	13	13	26
210	1	14	13	13	15	28
220	0	5	11	11	5	16
230	1	2	12	12	3	15
240	3	2	10	10	5	15
250	2	0	17	17	2	19
260	8	1	12	12	9	21
270	3	0	17	17	3	20
280	3	1	11	11	4	15
290	5	2	11	11	7	18
300	3	0	10	10	3	13
310	2	0	10	10	2	12
320	2	0	3	3	2	5
330	3	0	1	1	3	4
340	2	0	2	2	2	4
350	0	0	1	1	0	1
360	0	0	1	1	0	1
370	0	0	3	3	0	3
380	0	0	3	3	0	3
390	0	0	1	1	0	1
400	0	0	3	3	0	3
410	0	0	1	1	0	1
420	0	0	0	0	0	0
430	0	0	1	1	0	1
440	0	0	0	0	0	0
450	0	0	0	0	0	0
N =	45	95	205	205	140	345
PSD	51	06	36	36	25	32

Table 6. Comparison of length frequencies of smallmouth bass collected, tagged, and checked in angler creels, and reward tag returns from the Snake River below Hells Canyon Dam, 1991.

Length (mm)	Number collected	Number tagged	Creel	Tag returns
200	26	1	2	0
210	28	4	2	1
220	16	3	3	0
230	15	12	0	2
240	15	12	1	2
250	19	19	2	3
260	21	21	4	3
270	20	20	3	5
280	15	15	4	3
290	18	15	5	5
300	13	13	8	1
310	12	12	7	3
320	5	5	6	0
330	4	4	5	0
340	4	4	4	0
350	1	1	2	0
360	1	1	2	1
370	3	3	1	1
380	3	3	3	0
390	1	1	0	0
400	3	3	1	0
410	1	1	1	0
420	0	0	1	0
430	1	0	0	0
440	0	0	0	0
450	0	0	0	0
Total	490	174	67	30

Age and Growth

Length at age was back-calculated from scale analysis (Figure 1). The body/scale relationship is defined by the regression equation:

$$Y = 49.4 + 1.78X \quad (n = 63, r^2 = .91)$$

Length at age through age 3 was very similar to measurements made in 1985 (Lukens 1985). However, an increase in length at age was evident in age classes 4 through 7 (Figure 2).

Tag Returns and Mortality

We applied the scale analysis of age frequency to the total sample length frequency to generate a population age distribution (Figure 3). We built a catch curve from the age distribution that resulted from the early sampling below rkm 280 (Figure 4). The catch curve assumes that age 3+ and older fish were fully recruited to electrofishing gear. Total instantaneous mortality (-Z) from the catch curve is 1.04. Angler exploitation (E) on bass tagged below rkm 175 was estimated at 21% (27/130). We tagged 44 bass above rkm 343 on May 30. Exploitation was estimated at 9% (5/44). The estimates could underestimate actual exploitation. Fish were marked well into the angling season. Due to the remote area, non-reporting of tag recoveries must be considered.

We examined smallmouth bass in spot creel checks and measured lengths. Comparing these lengths to the lengths of fish tagged indicated that we probably did not influence anglers to keep smallmouth (<250 mm) because of a reward tag (Table 6).

Exploitation of tagged bass ranging in size from 200 to 310 mm was estimated at 19.2% (25/130). Exploitation of tagged bass larger than 310 mm was estimated at 13.5% (5/37) (Table 6).

Of the 30 tags returned in 1991, the average time at large was 42 days (minimum of 2, maximum of 179). The average distance from place marked to recovery location was 6.4 km (minimum of 0, maximum of 30.4) (Table 7). Recovery location information is unreliable as some anglers roughly approximate the location or may misname landmarks.

LARGE RIVER TROUT STREAM EVALUATION

Methods

We performed spot creel survey checks on the Clearwater River between Lewiston and Orofino through the summer fishing season.

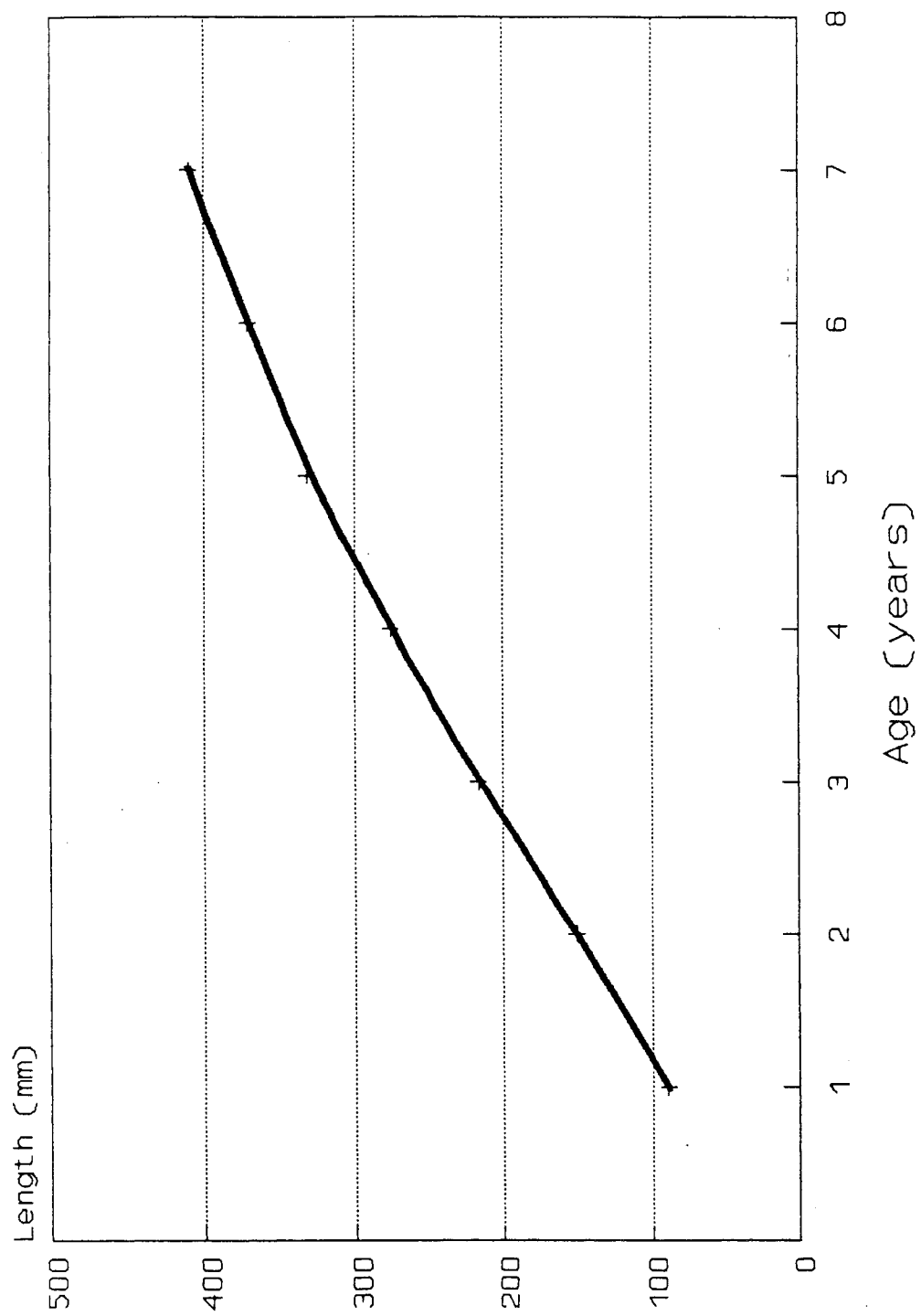


Figure 1. Backcalculated length at age for smallmouth bass in the Snake River.

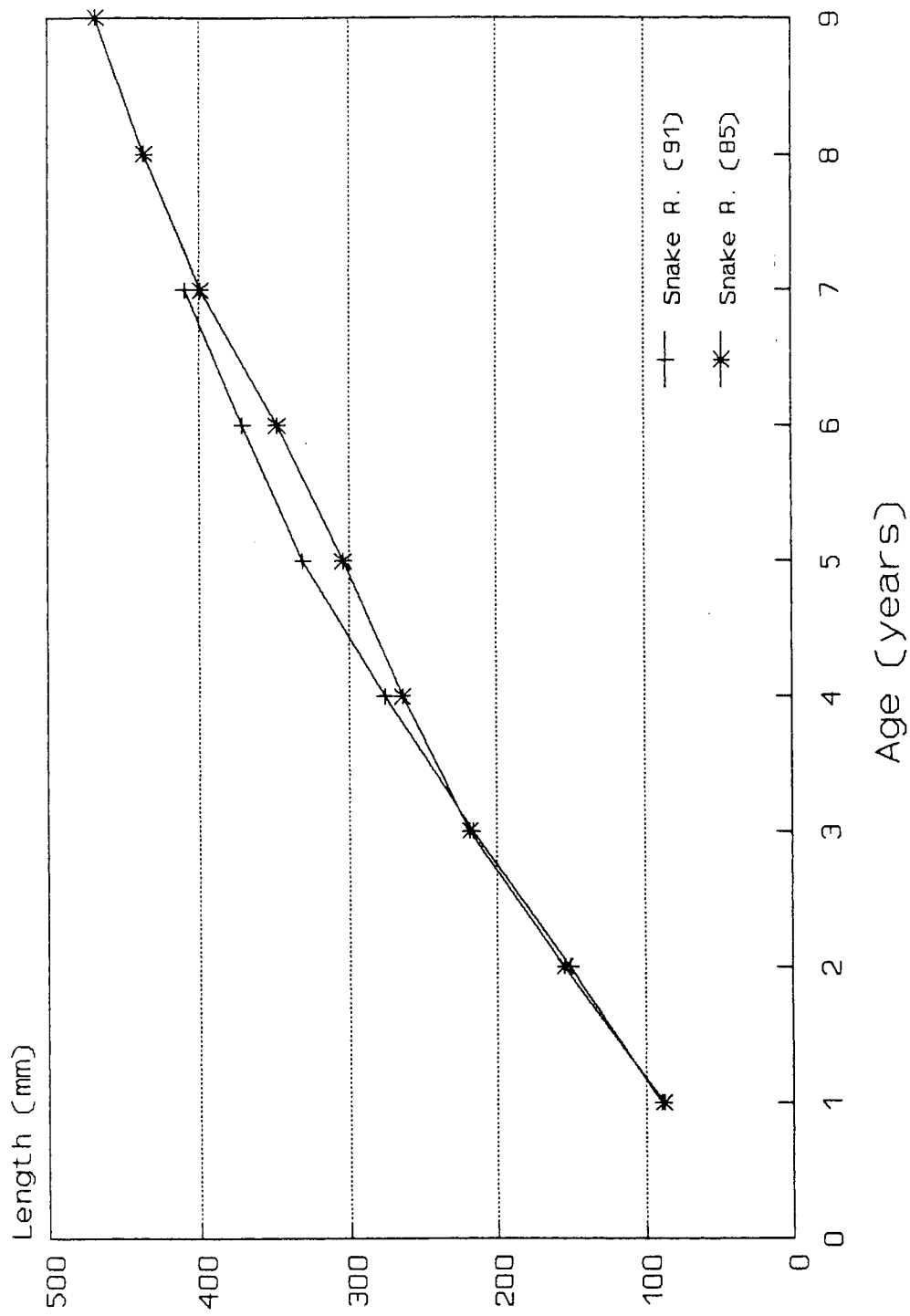


Figure 2. Comparison of length at age for smallmouth bass in the Snake River below Hells Canyon Dam (Lukens 1985).

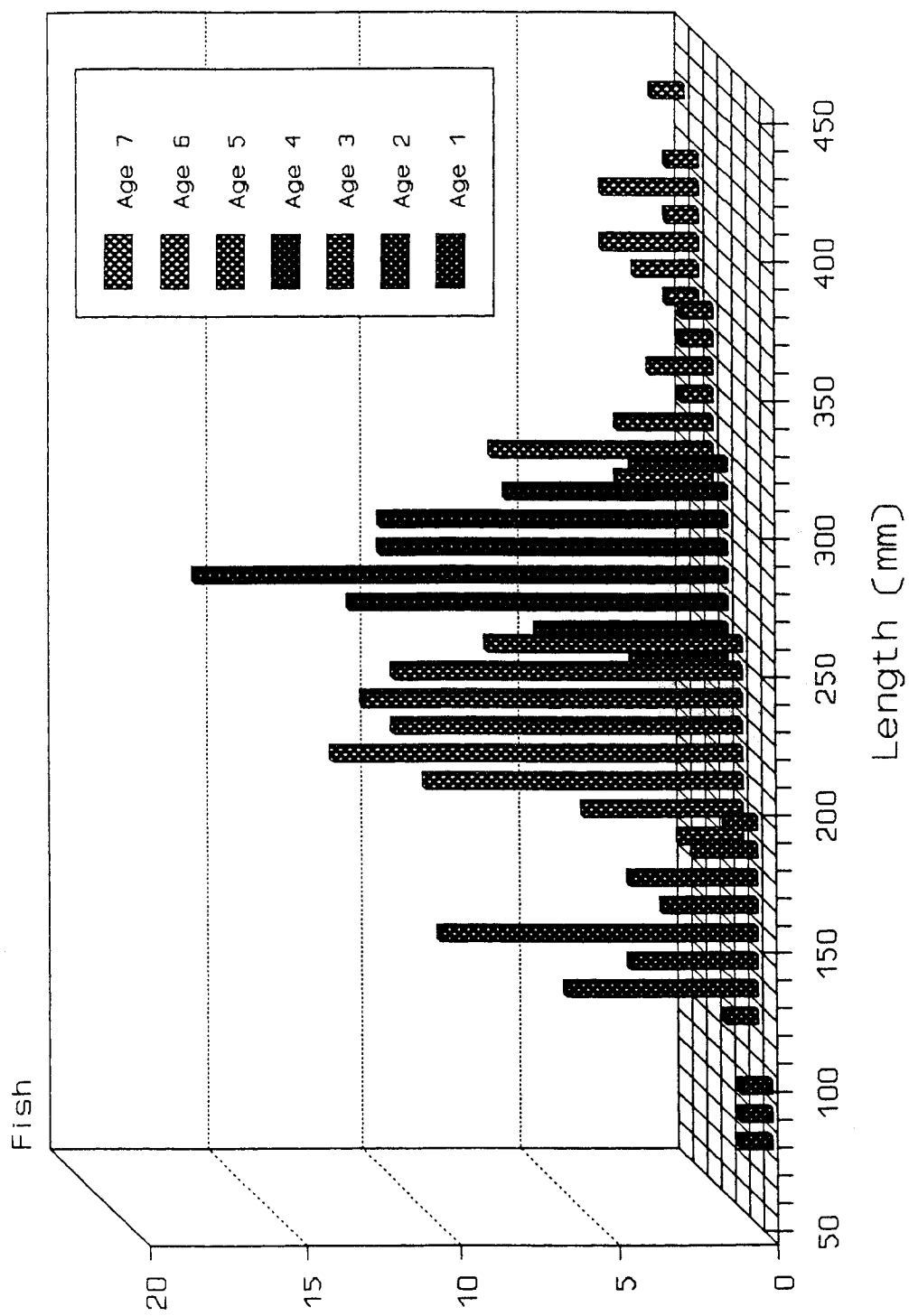


Figure 3. Age distribution of smallmouth bass in the Snake River below Hells Canyon Dam, 1991.

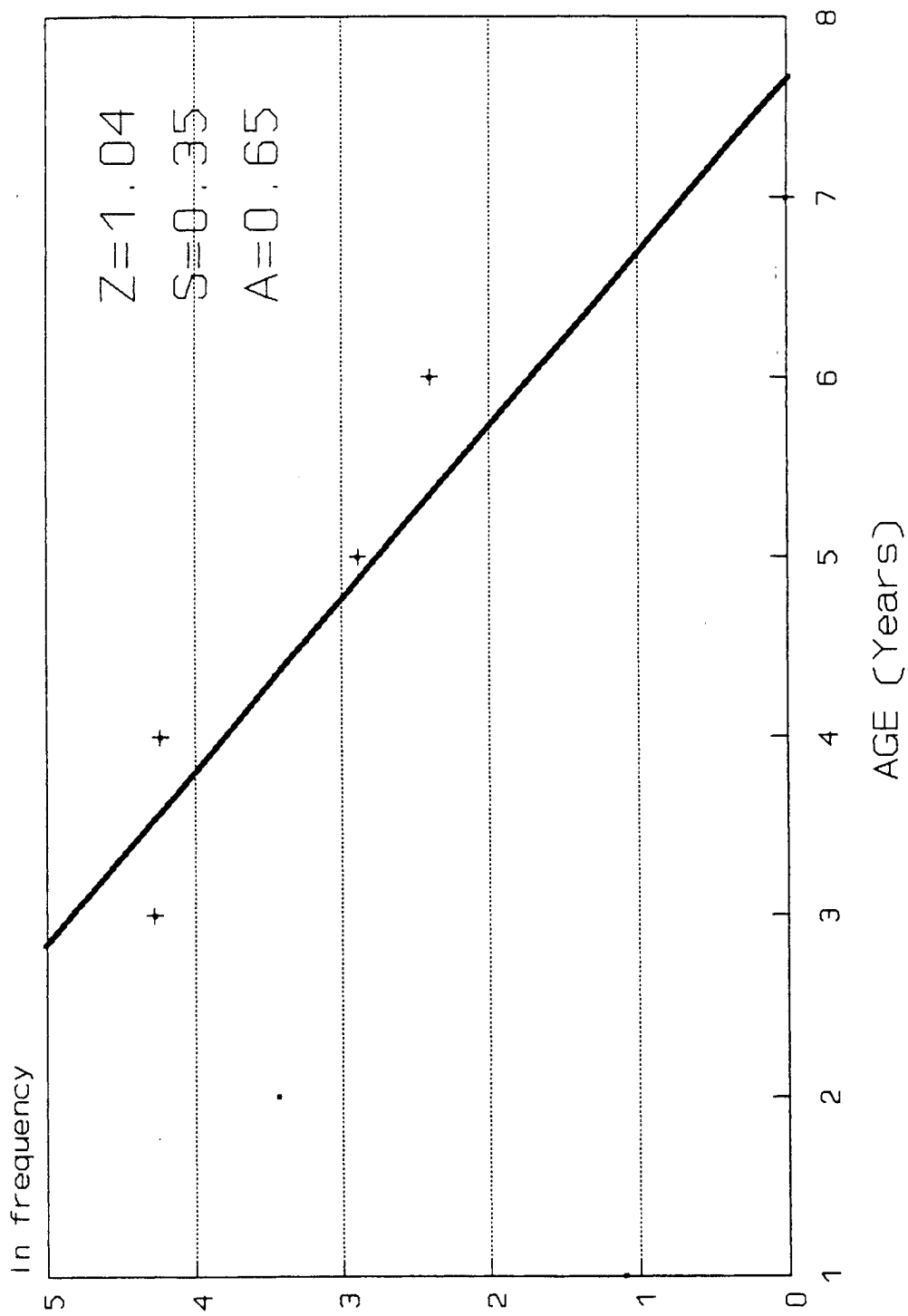


Figure 4. Catch curve for smallmouth bass in Snake River.

Table 7. Summary of reward tag returns from smallmouth bass tagged in the Snake River below Hells Canyon Dam, 1991.

Tag number	Length (mm)	rkm tagged	Date tagged	rkm recovered	Date recovered	Days at large	Distance from mark	Distance absolute value
501	250	237	4/24/91	253	5/5/91	11	16.0	16.0
646	285	235	5/2/91	250	7/4/91	63	14.4	14.4
649	310	235	5/2/91	237	7/6/91	65	1.6	1.6
523	271	275	4/19/91	288	6/16/91	58	12.8	12.8
579	240	230	5/1/91	230	7/23/91	83	0.0	0.0
1976	285	256	6/22/91	238	6/25/91	3	-17.6	17.6
574	250	224	5/1/91	229	6/5/91	35	4.8	4.8
629	272	240	5/30/91	270	6/3/91	4	30.4	30.4
516	282	272	4/19/91	270	5/31/91	42	-1.6	1.6
665	287	365	5/30/91	362	6/2/91	3	-3.2	3.2
638	300	224	5/2/91	240	5/11/91	9	16	16.0
648	230	235	5/2/91	230	6/3/91	32	-4.8	4.8
603	355	240	5/2/91	240	5/4/91	2	0.0	0.0
585	260	230	5/1/91	228	5/10/91	9	-1.6	1.6
610	270	240	5/2/91	230	5/17/91	15	-9.6	9.6
599	273	240	5/2/91	240	5/11/91	9	0.0	0.0
647	365	235	5/2/91	224	5/16/91	17	-11.2	11.2
578	225	224	5/1/91	224	5/19/91	18	0.0	0.0
539	305	235	4/24/91	234	6/26/91	63	-1.6	1.6
609	247	240	5/2/91	240	6/16/91	45	0.0	0.0
643	266	235	5/2/91	238	5/22/91	20	3.2	3.2
590	265	230	5/1/91	229	6/6/91	36	-1.6	1.6
527	253	237	4/24/91	232	6/11/91	48	-4.8	4.8
542	238	235	4/24/91	234	6/1/91	38	-1.6	1.6
580	270	230	5/1/91	229	6/2/91	32	-1.6	1.6
581	290	230	5/1/91	229	6/12/91	42	-1.6	1.6
534	208	237	4/24/91	240	6/9/91	46	3.2	3.2
522	308	275	4/19/91	272	10/15/91	179	-3.2	3.2
671	270	365	5/30/91	358	7/21/91	52	-6.4	6.4
684	256	365	5/22/91	358	7/21/91	60	-6.4	6.4
672	272	365	5/30/91	357	8/16/91	78	-9.6	9.6
682	275	365	5/30/91	357	8/16/91	78	-9.6	9.6
Average						40		6.4
Minimum						2		0.0
Maximum						179		30.4

We conducted two sampling trips on the lower Salmon River from Hammer Creek (rkm 84.8) to the mouth on August 14, 15, and 16, and on September 16, 17, and 18. Sampling included rod and reel collection of rainbow trout *O. mykiss* and smallmouth bass.

In both cases, we were specifically looking for domestic Kamloops rainbow trout and Spokane strain rainbow trout. Both of these rainbow strains had been stocked in these rivers in October 1989 and 1990 (Table 8). In 1989 and 1990, the Kamloops rainbow trout for both rivers were marked with a left ventral fin clip. A quality control check in 1989 on Kamloops at the time of stocking shows 83.6% had a good or excellent mark. However, 11.4% (16/140) had either no mark or a right ventral fin clip. In 1989, the Spokane strain were marked with a right ventral fin clip. A quality control check showed 83.5% had a good to excellent mark and 16.5% had a fair or poor mark. The Spokane rainbow trout stocked in 1990 were mismarked with an adipose clip. The allocation for the Clearwater River was remarked with a right ventral clip. The Salmon River allocation was stocked with just the adipose clip mark.

Quality control checks on fin clips in 1990 on Kamloops rainbow trout showed 58.1% good or excellent and 41.9% fair or poor (n=112). The check on the Spokane rainbow trout stocked in the Clearwater River (adipose and right ventral clip) showed 79% good or excellent and 21% fair or poor (n=67). The Spokane rainbow trout stocked in the Salmon River (adipose clip) were 98% good or excellent (n=67).

A good or excellent rating indicates low probability of fin regeneration. The fair or poor rating indicates a high probability of at least partial, if not complete, fin regeneration.

Results

Creel Contribution and Relative Abundance

Creel survey information from the lower Clearwater River (Table 4) shows anglers fish 203.75 hours to catch 44 rainbow trout for a catch rate of .216 fish/h. Ten trout were released. Of the 34 rainbow trout kept, 9 (20%) originated from the October fingerling plants. Eight of the nine trout were less than 320 mm and resulted from the 1990 plant (Table 9). The Kamloops rainbow trout returned at twice the rate of the Spokane rainbow trout; however, the sample is very small.

Length frequency of fish collected from the Salmon River is shown in Table 10. We collected 437 smallmouth bass and 63 rainbow trout. We estimated our level of effort at 177 rod hours. Our combined catch rate for the two sampling trips was .36 trout per rod hour.

Kamloops and Spokane strains made up 19% (16/63) of the rainbow trout catch from the Salmon River. Residulaised steelhead smolts made up 60.6%, and unmarked (natural/wild) rainbow trout made up the remaining 17.4% of the catch. However,

Table 8. Summary of fingerling domestic Kamloops and Spokane strain rainbow trout stocking in the Clearwater and Salmon rivers, Region 2, 1989 and 1990.

Date	Number	#/lb	Strain	Mark	Location ^a
Clearwater River					
10/4/89	8,362	14.8	K1	LV	Peck
10/4/89	3,108	14.8	K1	LV	Big Eddy
10/4/89	3,700	14.8	K1	LV	Big Eddy
10/4/89	2,960	14.8	K1	LV	Big Eddy
10/4/89	4,934	14.8	K1	LV	Cherry Lane
10/4/92	3,256	14.8	K1	LV	Lower Myrtle
10/5/89	6,900	6.9	RS	RV	Peck
10/5/89	4,140	6.9	RS	RV	Big Eddy
10/5/89	2,450	6.9	RS	RV	Big Eddy
10/5/89	3,450	6.9	RS	RV	Big Eddy
10/5/89	6,900	6.9	RS	RV	Cherry Lane
10/5/89	3,450	6.9	RS	RV	Lower Myrtle
10/9/90	6,500	16.0	K1	LV	Pink House
10/9/90	6,500	16.0	K1	LV	Peck
10/9/90	6,500	16.0	K1	LV	Big Eddy
10/9/90	6,500	16.0	K1	LV	Cherry Lane
10/11/90	9,122	17.8	RS	Ad RV	Pink House
10/11/90	9,122	17.8	RS	Ad RV	Peck
10/11/90	9,123	17.8	RS	Ad RV	Big Eddy
10/11/90	9,123	17.8	RS	Ad RV	Cherry Lane
Salmon River					
10/2/89	8,330	14.8	K1	LV	Twin Bridges
10/2/89	8,330	14.8	K1	LV	Hammer Creek
10/2/89	8,340	14.8	K1	LV	Pine Bar
10/5/89	10,695	6.9	RS	RV	Twin Bridges
10/13/89	10,695	6.9	RS	RV	Hammer Creek
10/13/89	13,500	6.9	RS	RV	Pine Bar
9/13/90	11,885	15.7	K1	LV	Twin Bridges
9/13/90	11,885	15.7	K1	LV	Hammer Creek
10/11/90	17,508	17.3	RS	Ad	Twin Bridges
10/11/90	17,525	17.3	RS	Ad	Hammer Creek

^a	Peck	rkm 56.8	Twin Bridges	rkm 99.2
	Big Eddy	rkm 45.6	Hammer Creek	rkm 84.8
	Cherry Lane	rkm 34.2	Pine Bar	rkm 68.2
	Lower Myrtle	rkm 24.8		

Table 9. Length frequency of rainbow trout from creel surveys on the Clearwater River from Lewiston to Orofino, 1991.

Length (mm)	RBT (no mark)	Residual smolts	K1 (LV clip)	RS (RV clip)
150	0	0	0	0
160	0	0	0	0
170	0	0	0	0
180	1	0	0	0
190	0	0	0	0
200	0	1	0	0
210	1	1	0	0
220	0	1	0	0
230	1	0	0	0
240	0	1	0	0
250	0	1	0	0
260	1	1	1	0
270	0	2	0	1
280	1	3	2	1
290	0	2	1	0
300	1	1	1	1
310	0	0	0	0
320	0	1	0	0
330	0	1	0	0
340	0	0	0	0
350	1	1	0	0
360	0	0	0	0
370	0	1	0	0
380	0	0	0	0
390	0	0	0	0
400	0	0	1	0
Total	7	18	6	3

RBT = rainbow trout
K1 = Kamloops rainbow trout
RS = Spokane rainbow trout

Table 10. Length frequency of fish collected with hook and line in the lower Salmon River, 1991.

Length (mm)	SMB	Residual smolts	K1 (LV clip)	RS (RV clip)	RBT (no mark)
100	0	0	0	0	0
110	2	0	0	0	0
120	1	0	0	0	0
130	3	0	0	0	0
140	1	0	0	0	0
150	1	0	0	0	0
160	0	0	0	0	0
170	1	0	0	0	0
180	3	0	0	0	0
190	7	0	0	0	1
200	24	0	0	0	1
210	29	0	0	0	0
220	53	1	0	0	0
230	82	2	0	0	0
240	70	1	0	0	1
250	42	6	0	0	1
260	37	2	0	0	0
270	24	2	0	0	0
280	16	4	0	0	0
290	9	7	0	0	0
300	12	0	0	0	0
310	7	4	0	0	1
320	6	3	0	0	1
330	2	3	0	0	0
340	3	2	0	0	1
350	1	0	1	1	2
360	0	1	2	0	0
370	0	1	0	0	1
380	0	0	0	0	0
390	1	0	0	3	0
400	0	1	1	0	0
410	0	0	3	0	0
420	0	0	0	0	1
430	0	0	0	0	0
440	0	0	1	0	0
450	0	0	0	0	0
Total	437	40	8	4	11

when examining the 16 trout in the catch 350 mm and larger, Kamloops and Spokane rainbow trout produced 62.5% of the catch.

The abundance of Spokane rainbow trout may be underestimated, as the 1990 release group had been marked with an adipose clip (Table 8), the same mark that residualized steelhead smolts have. We could not distinguish between the adipose groups by condition factor of individual fish.

Growth

We made scale impressions from four Kamloops rainbow and two Spokane rainbow ranging in size from 356 to 410 mm from the Salmon River. Scale analysis indicated all of these fish had two growing seasons in the river (1989 plant). Previous reports from anglers and creel survey data from the Clearwater River (Table 9) indicate these fish range from 260 to 320 mm after one growing season in the river.

Diet

We examined, by dissection, the stomachs of all 21 Kamloops and Spokane sampled or checked in the Salmon and Clearwater river. We sampled 46.5% (27/58) residualized steelhead smolts and 33.3% (6/18) unmarked rainbow.

Diet analysis of rainbow trout indicated similar food habits. Diet consisted of aquatic insects, terrestrial insects, snails, and green algae. No fish were found in the diet.

Smallmouth Bass

We sampled 437 smallmouth bass by rod and reel in the Salmon River (Table 10). With an estimated effort of 177 rod hours, the catch rate was 2.49 bass/h. Smallmouth bass in the Salmon River are managed under a 305 mm (12-in) minimum size regulation. Of the 437 bass in the catch, 26 (6%) were legal size. Thus, the catch rate for legal size bass was .15 fish/h.

Back-calculated length at age and comparison for smallmouth bass length at age in other area waters in 1991 (Dillon, IDFG, personal communication) are shown in Figure 5 and Figure 6, respectively.

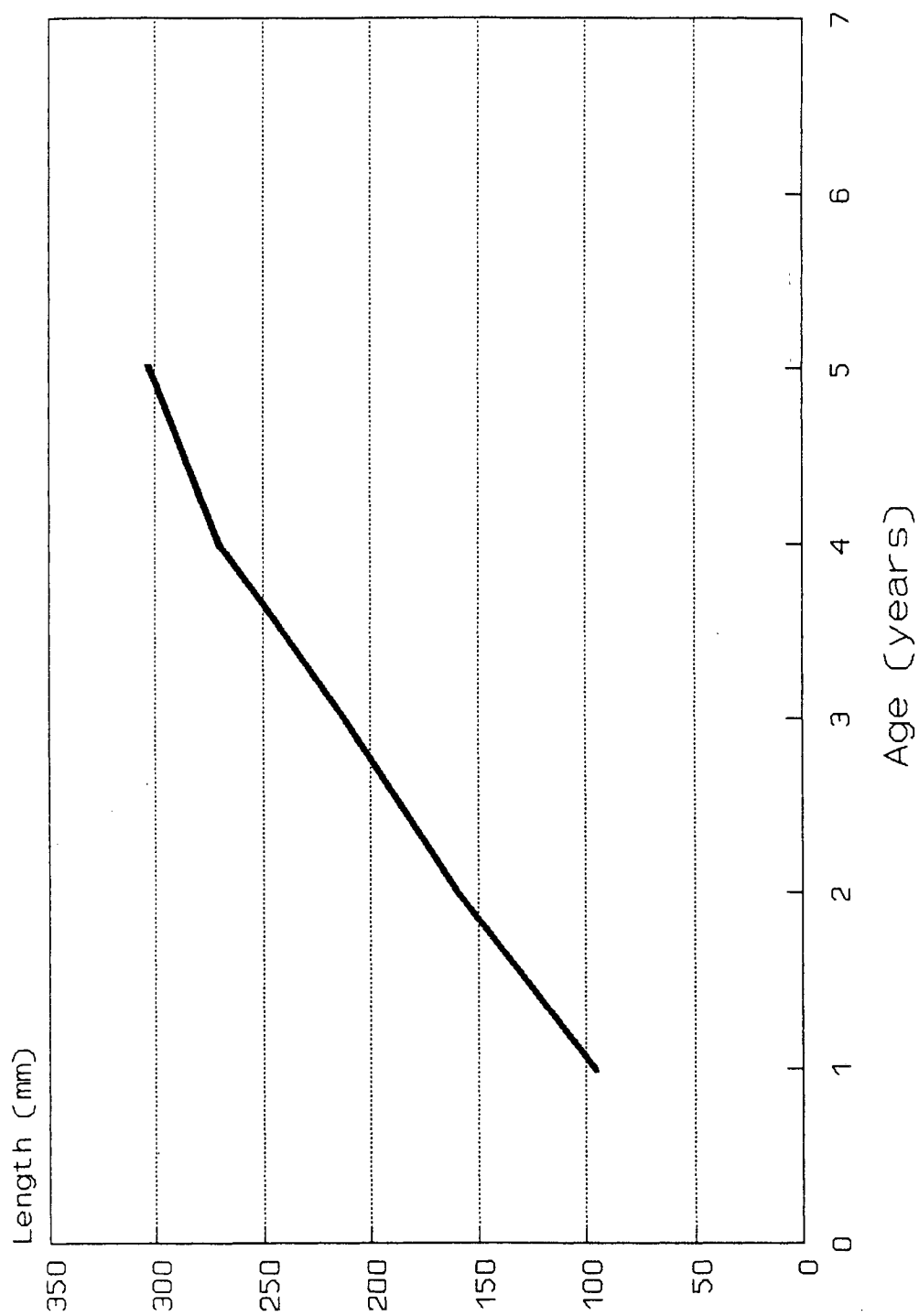


Figure 5. Length at age of smallmouth bass in the Salmon River below Riggins, Idaho, 1991.

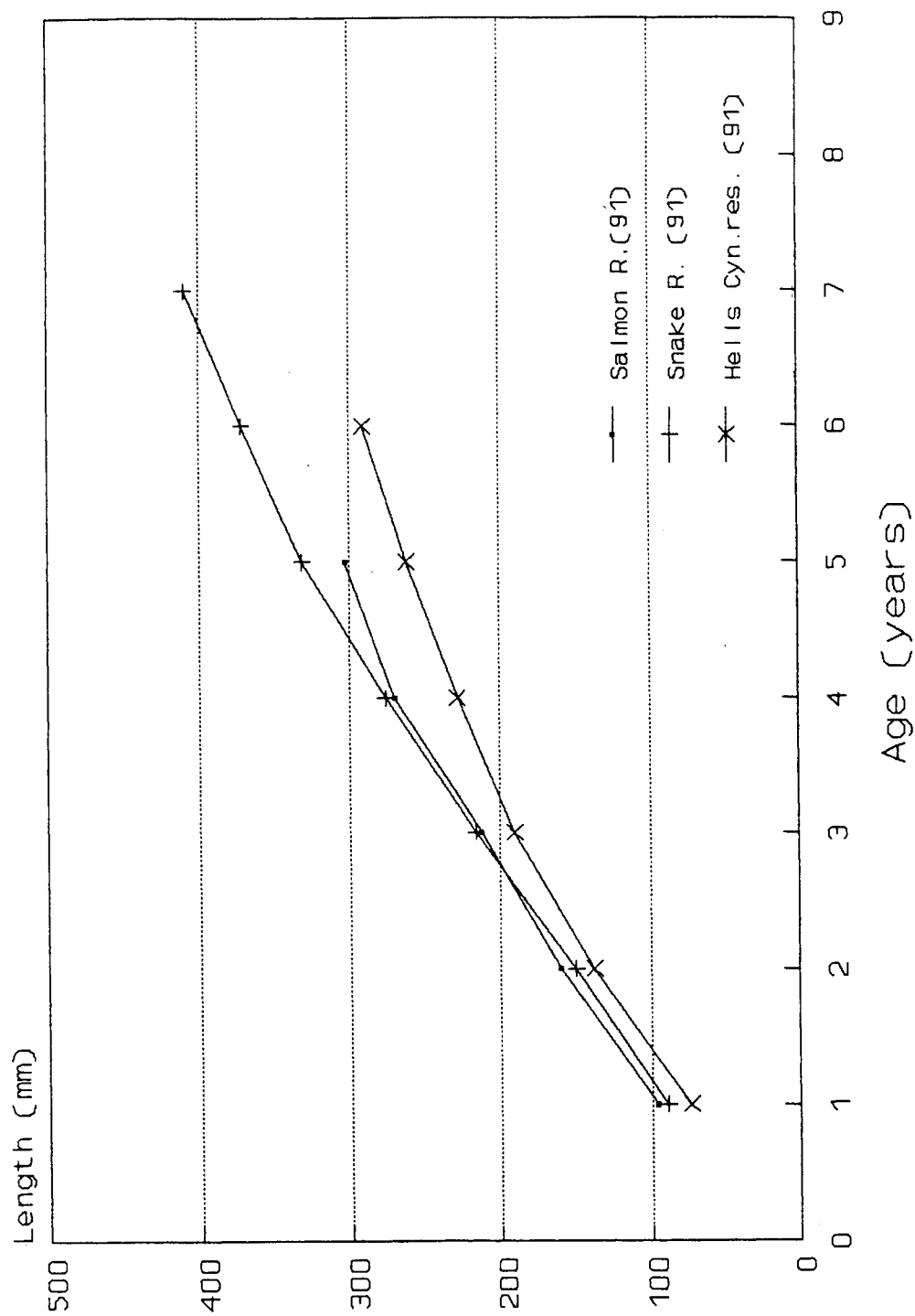


Figure 6. Comparison of length at age between smallmouth bass populations in the Salmon River below Riggins, the Snake River below Hells Canyon Dam, and Hells Canyon Reservoir, 1991.

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- Lukens, J.R. 1986. Hells Canyon resident game fish investigations. Job Completion Report, F-73-R-8. Idaho Department of Fish and Game, Boise.

JOB PERFORMANCE REPORT

State of: Idaho Name: Regional Fisheries Management
Investigations
Project: F-71-R-16 Title: Region 2 Technical Guidance
Job No.: 2-d
Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Region 2 fish management personnel offered technical guidance to six other agencies and 53 private entities during 1991.

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